The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXVII. September 10th, 1932 No. 689

Notes and Comments

New Industrial Development

HAVING examined the various arguments put forward in support of the proposed establishment of a new national research organisation as outlined in the terms of reference, the Committee on New Industrial Development set up by the Economic Advisory Council in March, 1931, under the chairmanship of Mr. J. H. Thomas, states in its report which was issued last week that it considers that such an organisation would cut right across the existing organisation of the Department of Scientific and Industrial Research, and would be likely in practice, by the confusion of purpose and distraction of effort it would cause, to injure rather than to forward the cause of scientific research in British industry. Moreover, the committee is satisfied that the existing Government organisation for the promotion of industrial research is efficient, and is sufficiently flexible to enable it to develop along such lines as may be desirable to meet the changing needs of industry. The committee is, therefore, unable to recommend the establishment of a new national organisation along the lines suggested. It is highly desirable that there should be at the disposal of the Government a small fund capable of being readily used for research developments, such as that which is at present at the disposal of the Advisory Council for Scientific and Industrial Research. It is considered, therefore, that when the balance of this fund is surrendered to the Exchequer at the end of the current year a sum of money should continue to be available for expenditure on research developments or unforeseen requirements by suitable provision in the Department's annual estimate. The evidence which the committee has received shows clearly how valuable are the services rendered to industry by the research associations established by particular industries, and it is hoped that it will be possible for His Majesty's Government to continue to provide financial assistance to these bodies on a scale sufficient to enable them to function effectively until such time as industry is in a position to bear the whole of their cost.

Centralisation of Research

DEALING in the report with the suggestion that there is a gap in the nation's research arrangements, the committee expresses some doubt as to whether greater progress would be secured by attempting to work on more centralised lines, inasmuch as the value of research depends on a readiness to apply its results. Moreover, the Department of Scientific and Industrial Research is always willing to create organisations of its own in important industrial fields where it recognises that a need for research exists. The committee holds also that there appears to be little danger in practice that discoveries arising in one part of the industrial field, as the by-product of research there carried on, will be wasted through lack of knowledge of them in the industries to which they are chiefly of interest.

On the question of large-scale tests, the committee points out that it is a commonplace that there is frequently a wide gap between the demonstration of a new industrial process on a laboratory scale and its demonstration on an industrial scale. The question of the extent to which facilities should be provided for large-scale tests, or for what is sometimes called "development research," is not one, it says, which can be settled in general terms. So far as organisation is concerned, the requirements of development research seem adequately provided for by the machinery of the Department of Scientific and Industrial Research and provide no useful scope for the creation of a new organisation.

Paint and Colour Duty

ACCORDING to an Order issued by the Treasury on September 1, certain adjustments are made in the scope of the import duties on paints and colours. Since the imposition of an additional duty by the Order of April 19, the Import Duties Advisory Committee has satisfied itself that the definition of the goods to which the duty applies requires amendment. In the first place, printers' ink, varnishes, lacquers, and enamels were excepted by the committee from the recommendation as a measure of caution. It has now, however, reached the conclusion that there is no justification for any differentiation in duty between these and the generality of articles covered by the definition. It accordingly proposes that these exceptions should not be continued. After considering many representations as to the scope of the heading the committee has come to the conclusion that, subject to certain exceptions, there is no case for any differential treatment of pigments, extenders, or fillers; and it is satisfied that, while the colour makers need protection, there is no reason to suppose that such protection will react prejudicially upon the production of paints. The proposed new definition, therefore, includes at the same rate of duty finished products such as paints, enamels and distempers, and materials such as pigments and extenders.

The proposed exceptions fall into three main classes. The committee feels that it is desirable to maintain the exception from additional duty of those pigments the importation of which is controlled by the Dyestuffs (Import Regulation) Act; these pigments are prohibited imports, and licences are as a rule granted only

in cases where there is no suitable British equivalent. Secondly, the committee proposes the exception of certain articles which are not procurable in sufficient quantities within the Empire, such as dry earth colours. The third class of exceptions consists of substances, such as graphite, which, though technically included within the term "pigments," are only to a small extent used as such, but are to a very much greater extent used in industries other than the paint trade.

A Desirable Amalgamation

ARRANGEMENTS for an amalgamation between the Physical Society of London and the Optical Society, to which we referred five months ago, have now taken more definite form, the Optical Society having issued a notice of a special general meeting, to be held at the Imperial College of Science and Technology on September 22, at which the following resolution is to be submitted: "That it has been proved to the satisfaction of this meeting that it is desirable that this Society be dissolved and accordingly the Society be dissolved, and that the assets of the Society after satisfaction of the debts and liabilities of the Society shall be transferred to the Physical Society, subject however to all liabilities of the Society as guarantors, trustees or otherwise in respect of the assets of the Society; and further that for the purposes of such dissolution Major E. O. Henrici, of 1, Lowther Gardens, Exhibition Road, London, be and he is hereby appointed as the person to get in such assets and to discharge such debts and liabilities thereout and transfer any surplus there may be to the Physical Society; and the trustees of the Society are hereby authorised to deal with the investments standing in their name as the said Major Henrici shall from time to time direct; and the said Major Henrici is hereby authorised to operate the Society's banking account in place of the persons heretofore having such authority."

The two societies have worked in close harmony for several years. The Physical Society is the older of the two, having been founded in 1874, whilst the Optical Society came into being 25 years later. About half the members of the councils of the two societies have been identical, joint meetings have been frequent and both bodies have shared the same headquarters. Once each year they have acted jointly as organisers of an exhibition of scientific instruments and apparatus. Their amalgamation will be all to the good of the interests which they represent.

Wholesale Aluminium

ALUMINIUM concerns us more from the chemical point of view than the domestic, but we are interested in the efforts which the British Aluminium Hollow Ware Manufacturers' Association is making to reassure the users of its domestic products that there is no foundation for the scares which arise from time to time regarding the potential danger to health from their use. A few weeks ago we published summaries of a series of papers presented at a meeting of the Society of Public Analysts on the subject, and now the Aluminium Hollow Ware Manufacturers' Association has issued a 12-page booklet setting out in non-technical terms the results of extended investigations, which show that the use of aluminium in the kitchen is definitely not injurious Dr. Eastes in 1930 stated that he found in heating milk in an aluminium vessel that it took up 140 grains of material per gallon, the greater part of which was aluminium. This single result, however, has since been challenged, and no subsequent worker has confirmed such an enormous solution of metal. All recent works point to the conclusion that only infinitesimal quantities of aluminium are dissolved out by ordinary cooking processes.

It is well known, as the booklet points out, that alkalies act as solvents of aluminium, and therefore salts of soda, such as washing soda and bicarbonate of soda, should not be used for cleansing. Small quantities used for cooking purposes, however, are innocuous. Neutral content has no effect on aluminium and it is not readily dissolved by weak organic acids, and therefore can be used with safety for cooking fruit or vegetables. The "black" deposit, of microscopic thickness, which forms on the interior of aluminium vessels in which water is heated, consists of lime and iron. It is only optically black and as it thickens it assumes a grey-white appearance. It is quite harmless and is analogous to the ordinary fur which forms on the interior of iron and tin kettles, and performs a useful service in protecting the food from direct contact with the metal.

Aluminium in Foods

ALUMINIUM is a natural constituent of ordinary water and of most foods, though present only in traces. A litre of milk, for example, contains five milligrams of aluminium, and a loaf of bread eight milligrams. Lettuce contains 29.6 parts of aluminium per million parts, beef 13.9, and dried eggs 12.4. It is obvious that, regardless of the type of vessel in which food is prepared, we are all ingesting some aluminium from our daily diet, in common with iron, calcium, and other salts, and it is reasonable to conclude that it plays some rôle in human nutrition and metabolism. The aluminium, therefore, that passes into the contents of cooking utensils is not a substance foreign to natural food, and the question is whether the increase due to the solution of the metal is deleterious to health. The total daily intake of aluminium from a mixed diet has been variously calculated by different authorities. Dr. K. B. Lehman of the Würtzburg University puts it as high as 70 milligrams, and G. T. Cox, of the Mellon Institute, Pittsburg, as low as 7 milligrams.

A mass of evidence is given in the booklet to show that the use of aluminium is perfectly safe. It records that as a result of a scare in the United States that the use of aluminium baking powders was dangerous to health, the Department of Agriculture instituted a Board of Inquiry. The report describes experiments on twenty-six University students carried out in three different Universities, who were given amounts of alum varying from 0.2 gram to 10 grams daily for about six months. It was unanimously reported from the results of these experiments that the amounts of aluminium likely to be consumed as a result of alum in baking powder, estimated as up to 1.16 grain of aluminium per person per day, are much too small to have any ill effect. The amounts of aluminium which arise from aluminium vessels are estimated from analyses carried out by Massatch to be about 0.1 grain per person daily. These feeding tests on human subjects confirm the results already obtained by numerous bio-chemical feeding tests on animals.

Glass Lined Steel

Its Utility in Processing and Storage Plant

This article is based on information supplied by Enamelled Metal Products Corporation, Ltd. (established in Great Britain in 1807), the English house of The Pfaudler Company of the United States, the originators of glass-lined equipment.

GLASS is non-absorbent, non-corrosive, and does not contaminate the most sensitive chemical products. In consequence the application of glass in the form of a lining for steel equipment will effectively prevent loss by absorption, and will protect sensitive and volatile liquids against deterioration due to metallic action. The smooth glass lining, moreover, facilitates the cleaning of the equipment and eliminates the risk of discoloration of products during manufacture or storage. At the present time such glass-lined equipment is being employed for a wide variety of

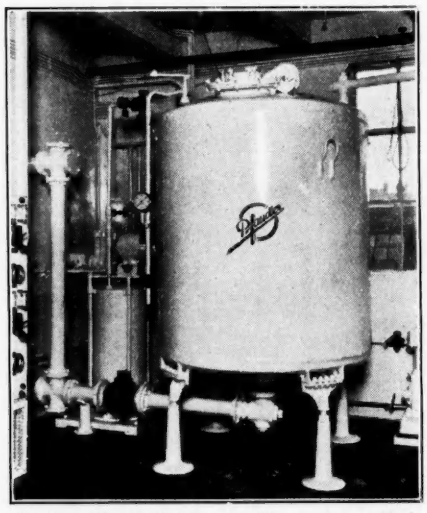


Fig. 1. "Pfaudler" Glass Lined Reserve Storage Tank in use for Finished Dental Cream. (Kolynos Inc., London)

products, including perfumes, essential oils, toothpastes, toilet preparations, photographic emulsions, alcoholic extracts, fine chemicals and pharmaceutical preparations.

Glass lined tanks are more desirable for the storage and blending of perfumes, especially as the colour of a perfumery product is a vital matter. Very frequently discoloration does not take place immediately on contact with metal, but occurs

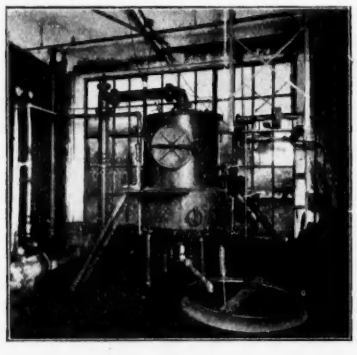


Fig. 2. The "Pfaudler" Vacuum Pan

at a much later time whilst the goods are awaiting sale by the retailer. Any such discoloration is detrimental to sales, and the ultimate consequence is often inestimable.

The employment of good reliable glass lined equipment, however, will ensure that perfumery products are and will continue to remain crystal clear. The smooth surface of the lining provides safe storage conditions, losses by absorption being eliminated by the nature of the lining, whilst losses by evaporation are avoided by the provision of a tightly fitting cover. The installation of such equip-

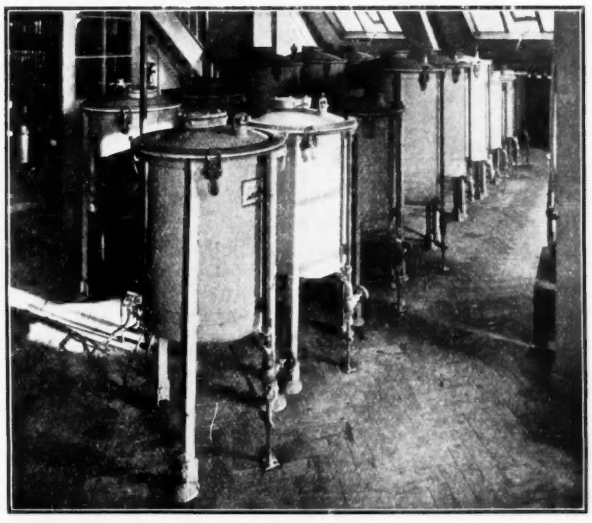


Fig. 3. A typical installation of "Pfaudler" Glass Lined Perfume Storage Tanks

ment in a perfumery factory also simplifies production and reduces the actual number of storage tanks required, for such tanks can be easily and effectively cleaned so that subsequent batches of perfume are not contaminated by their predecessors.

Fig. 4. "Pfaudler" Glass Lined Tanks used for processing a well-known Disinfectant

When used for the maturing and storage of a toilet preparation, such as dental cream or dental cream essence, glass lined equipment finds its chief virtue in the complete elimination of metallic taste, added to which there is no risk of discolouration. Fig. 1 shows a "Pfaudler" glass lined tank which is installed at a well-known dental cream works in London, serving in the capacity of a reserve storage tank for the finished product, prior to packing in collapsible tubes.

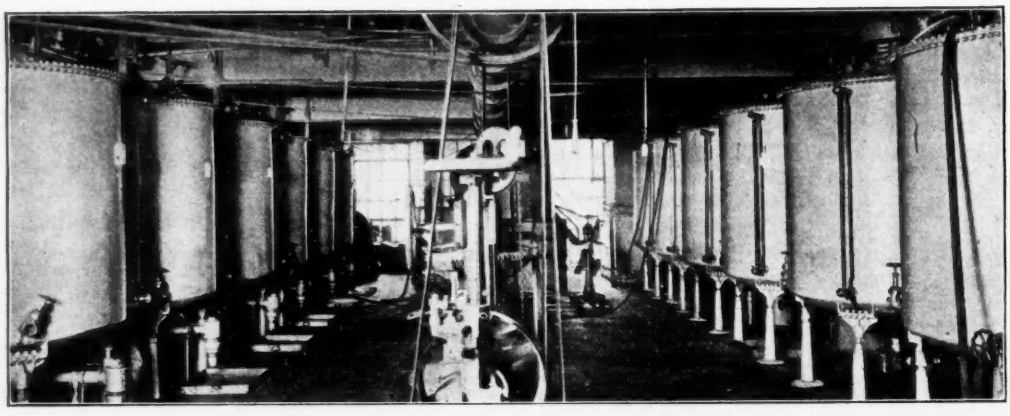


Fig. 5. An installation of "Pfaud'er" Glass Lined Pharmaceutical Mixing and Storage Tanks

It is due to a tank such as this that the tube-filling machines are never idle. Fig. 2 shows a Pfaudler vacuum pan; Fig. 3 a typical installation of glass lined perfumery storage tanks.

In the manufacture of pharmaceutical preparations it is particularly essential that the vessels be used which will not affect the product. Glass which is so widely employed in the laboratory is too frail for production on a commercial scale, but the steel construction of glass lined equipment remedies this disadvantage whilst retaining all the benefits of glass. Insulin, for instance, is processed in "Pfaudler" equipment by a number of prominent manufacturers. Cough syrups, tonics of certain proprietary brands, and some well-known disinfectants (Fig. 4) also owe their high degree of purity to the adoption of glass linings in the manufacturing plant employed. Fig. 5 shows a large installation of glass lined pharmaceutical mixing and storage tanks.

Many of the world's leading makers of food products have used glass lined equipment for many years of successful manufacturing activities. Products which have been prepared include sauces, salad dressings, soups, pickles, meat extracts, conserves such as jams and marmalade, fruit essences and syrups, coffee essence, fish paste and milk foods. It is significant that the producers of many nationally-known

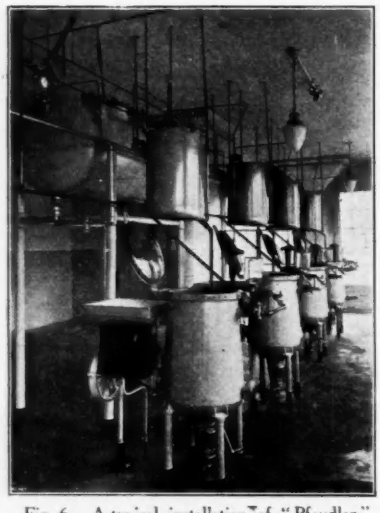


Fig. 6. A typical installation of "Pfaudler" Mayonnaire Emulsifiers with main Olive Oil Storage Tank and individual Supply Tanks

foods have adopted "Pfaudler" glass lined equipment, because it indicates a new idea of efficiency in maintaining purity in commercially manufactured foods. Processes which were deemed satisfactory in wooden or metal vessels have been found to be far more effective in vessels which are glass lined. The smooth, pore-free lining affords no crevices in which harmful bacteria may multiply. Cleaning such a tank does not necessitate drastic scouring methods, which gradually wear away less durable materials. Furthermore, there is no interaction between the glass lining and the product. A typical installation of mayonnaise emulsifiers with main olive oil storage tank and individual supply tanks is shown in Fig. 6. A close-up view of one of these emulsifying units is also given (Fig. 7).

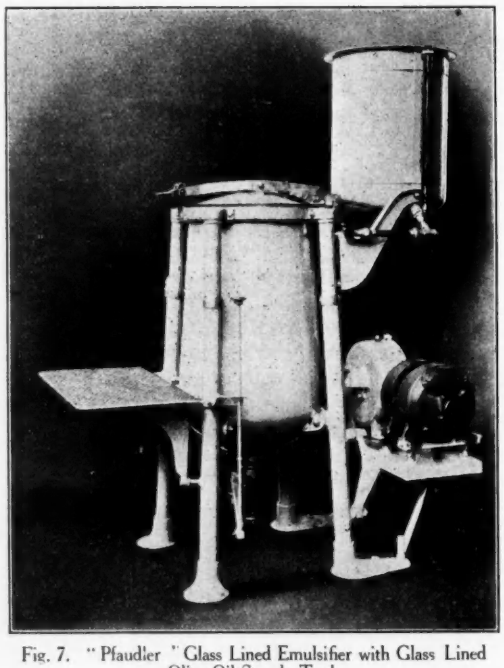


Fig. 7. "Pfaudler" Glass Lined Emulsifier with Glass Lined Olive Oil Supply Tank

The range of glass lined equipment which is now obtainable includes open boiling or evaporating pans (Fig. 8) storage vessels, blending tanks, receiving tanks, pre-heaters, mixers, vacuum pans, emulsifiers, percolators, essence stills, digesters, pasteurisers, transport tanks for liquids in bulk, self-contained mixers and filters, portable tanks, etc. Due to a wide variance in the type of service required of chemical process equipment, the makers have developed different types of equipment lined with a glass enamel that will best meet these conditions. Consequently, when making inquiry it is desirable to give the makers precise information upon the products to be handled, stating what acids are present, their degree of concentration, and general operating conditions. With this information the makers can then recommend the type of equipment and enamel most adaptable for the conditions specified.

For general storage work, such as handling petroleum products, medicinal compounds, dental creams, hair tonics, olive oil, etc., the closed all-welded tanks are very desirable. They are also used for steeping herbs in the preparation of cough syrups and tonics. While open tanks are used principally for simple solutions and emulsions, the closed type is recommended for liquids and compounds involving volatile constituents. Both single shell and jacketed closed all-welded tanks can be supplied with or without side agitator. In the case of such tanks holding less than 180 gallons, a removable cover is provided in place of a welded cover. Jacketed open mixing tanks are available for use where it is unnecessary to apply a vacuum or prevent evaporation of volatile compounds. Such tanks are frequently used for boiling solutions in the manufacture of chemical products; here an agitator is often advantageous because it ensures that the different ingredients are brought into intimate contact with one another. Jacketed closed mixing tanks are supplied for use in cases where either vacuum or pressure are necessary in heating, mixing, distilling and digesting a wide variety of solutions containing organic and inorganic acids. The vertical agitator provided is entirely glass enamelled; consequently very delicate control can be exerted in handling the products.

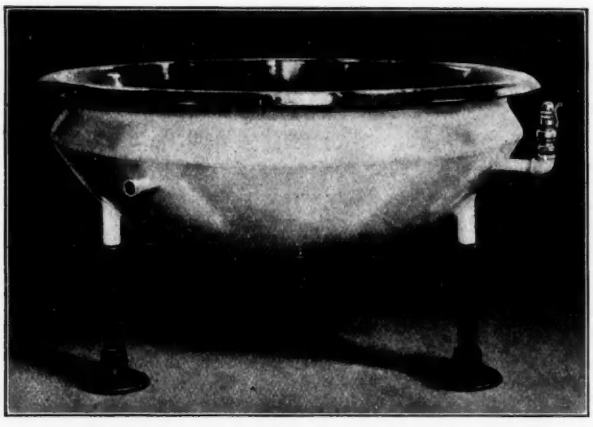
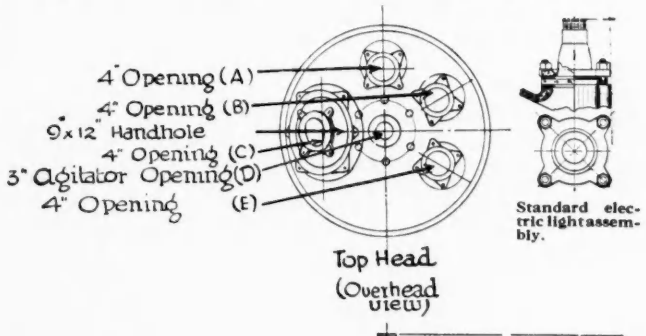
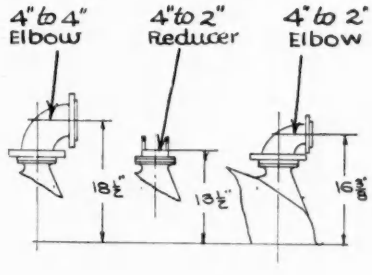


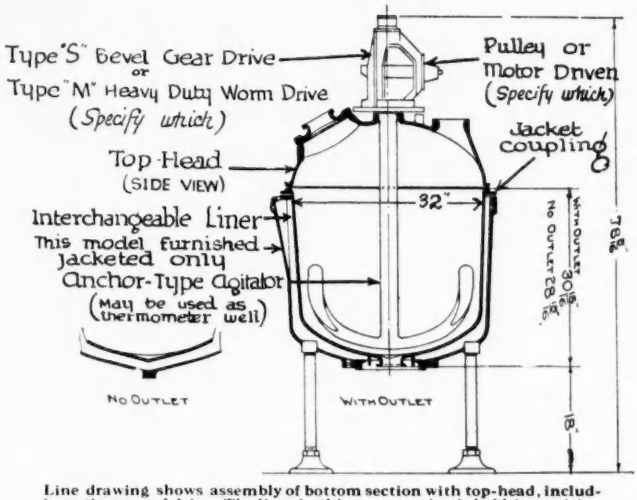
Fig. 8. One of the "Pfaudler" Glass Lined Jacketed Evaporating Pans

In order to meet the requirements of manufacturers for comparatively small glass-lined storage tanks the makers have standardised on the type shown in Fig. 3, which can be supplied in five sizes, namely, 25, 50, 100, 180 and 290 Imperial gallons capacity. They are constructed with a sloping self-draining bottom. This design is particularly advantageous for some expensive liquids, very small quantities of which may be worth many shillings. A tank which does not drain completely is a liability to the manufacturer. In the handling of viscous products also, the sloping bottom construction affords convenience in emptying, for there are no crevices to hold up or prevent complete drainage. These sloping bottoms are pressed by means of special forms which make each one perfectly uniform in its contour. The convenience of the side outlet is another obvious advantage. Each of these standardised vessels is lined with a "Pfaudler" glass enamel, which is resistive to most organic acids. They are therefore suitable for products such as perfumes, essential oils, syrups, distilled water, fruit juices, lacquers, shellacs, etc. The glass enamel with which these particular vessels are lined, however, is not intended for use with highly corrosive solutions and information respecting "Pfaudler" equipment lined with highly resistive glass enamels can be obtained upon request. Standardised portable tanks of tilting or non-tilting patterns are also supplied. Such tanks have a definite place in every up-to-date plant where

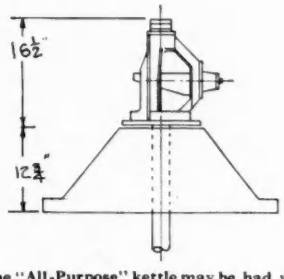


Standard electric light assembly.

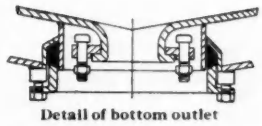




Line drawing shows assembly of bottom section with top-head, including agitator and drive. The liner in this construction is held in position by clamps, and may be removed without disturbing jacket connections.



The "All-Purpose" kettle may be had without the top-head as an open construction.



Detail of bottom outlet

A Special "Pfaudler" Reaction Kettle provided with cast iron Top-head and replaceable Steel Liner all Glass Lined

it is required to convey liquids from one part of the works to another. Even in the largest plant it is sometimes difficult to connect various units by pipe lines. To do so would mean the installation of an elaborate system of connecting lines and valves as well as the necessary pumps. A far more satisfactory system is the use of portable tanks equipped with easy-moving castors which permit the equipment to be shuttled from one part of the plant to another. Coupled with this there is the further advantage of having the portable tanks always available for emergency storage purposes, and the greater ease with which the tanks can be kept clean, as compared with pipe lines.

Experiments on the Hydrogenation of Bitumen

Investigations at the Fuel Research Laboratories, Ottawa

PRIOR to 1929 investigational work in Canada on bitumen from the bituminous sands of Alberta was concerned with its use as road-paving material and its amenability to refining into petroleum products by ordinary fire-still and pressure-cracking processes, the results thus obtained being compared with other results arising from crude petroleum and asphalt materials. Since that date, however, considerable attention has been paid to the value of this bitumen for hydrogenation treatment as compared with coal, coal tar and petroleum residues.

Pioneer Work

Considerable pioneer work has been carried out by S. C. Ells, of the Mines Branch, concerning its value for road and other similar purposes and methods for the economic separation of the bitumen, and this has been continued up to the present. Research work of a similar nature, but with special reference to the separation of the bitumen from the sands, and its comparative value for refining into petroleum products, has been conducted during the last decade by Dr. K. A. Clark of the Research Council of Alberta. Other investigators in Great Britain and the United States have been active in the study of Alberta bitumen, and their results are referred to in the comprehensive reports of both Ells and Clark, and in the technical literature.

The important work of the Division of Fuels and Fuel Testing, concerning laboratory methods for assaying both the raw bituminous sands and the extracted bitumen, may be mentioned next. The results of this work are published in the annual Investigations of Fuels and Fuel Testing for 1926, where also are to be found the results of pressure-cracking tests by the Cross process. The hydrogenation experimental work conducted by E. H. Boomer at Edmonton, and by T. E. Warren at Ottawa, brings this chronological sketch of investigational work on Alberta bitumen up to date.

Hydrogenation and Pressure Cracking

The results of experimental hydrogenation and pressure-cracking work on Alberta bitumen at the Fuel Research Laboratories, Ottawa, during 1930 and part of 1931 are now presented in detail in a Bulletin issued by the Mines Branch of the Department of Mines, Canada. ("Experiments on the Hydrogenation of Alberta Bitumen and on the effect of Pressure on the Pyrolysis of Methane," p. 21). While the main portion of the experimental work involved the high-pressure hydrogenation treatment of separated bitumen, results obtained with ordinary pressure cracking, without the use of hydrogen, have been included in order to show the relative merits of the two methods. The latter results were obtained by tests made in a bomb supplied by the Kansas City Testing Laboratory of the Cross Co., under the pressure and temperature conditions obtaining with the Cross process.

In conducting these tests the standard sample of dehydrated topped bitumen on hand in the Fuel Research Laboratories was used. The results obtained checked quite closely with those reported on the same sample by the Kansas City Testing Laboratory of the Cross Co., which firm is the sponsor and promoter of the Cross process.

In his hydrogenation experiments without the use of catalysts, Dr. Warren studied the effect of different variable factors, one at a time, namely: temperature, pressure and duration of reaction. In brief, the results were that gasoline formation and the tendency to form coke were both increased by higher temperatures and longer times of reaction, and that while the higher pressures decreased coke formation, the gasoline yield and corresponding kerosene yield were independent of pressure—at least within the pressure range used. Other observations were that the amount of hydrogen absorbed, while independent of temperature, increased with both longer duration and higher pressure, and that high pressure and long duration favoured the removal of sulphur as hydrogen sulphide, whereas high temperature did not.

Relative Efficiency of Catalysts

Attention is drawn to the method of reporting the results obtained, or rather to the criteria used in expressing the results of the different experiments in respect to the conversion of the raw bitumen into products of lighter specific gravity and higher boiling points. The yields of motor fuel expressed in terms of unrefined gasoline with a boiling point up to 410° F. and of the kerosene fraction are shown, instead of merely indicating the degree of cracking with and without hydrogen, by stating the yield of total cracked product irrespective of the end products to be derived therefrom, as is the custom in stating the many hydrogenation results found in the literature. It is interesting to note that of the several catalysts experimented with, nickel carbonate proved the most efficient in respect to depressing carbon formation, but this and other catalysts did not greatly increase the yield of gasoline in comparison with experiments under similar conditions without the use of catalysts. It was found, however, that certain reagents, *e.g.*, calcium or iron oxide, were effective, after preheating with hydrogen, in reducing carbon formation. This permits larger quantities of intermediate liquid product to be recirculated in a continuous hydrogenation process, resulting in a higher gasoline yield as the main product.

Slightly higher yields of unrefined gasoline were obtained by pressure cracking than by the batch hydrogenation treatment, but the refining loss may be expected to be greater. Ordinary cracking also produced more coke. In comparison with a possible yield of 30 to 40 per cent. by weight of gasoline by recycling in ordinary cracking processes without the use of hydrogen, yields of 65 to 75 per cent. by weight, equal to 90 to 100 per cent. by volume, are considered possible by continuous recycling hydrogenation treatment.

Pyrolysis of Methane

The report is in two parts. The first part is confined to hydrogenation and pressure-cracking experiments on Alberta bitumen for the production of motor fuel; the second part, the effect of pressure on the pyrolysis of methane, presents the results of some experiments made on a sample of natural gas consisting almost entirely of methane. The feature of this investigation is the use of a silica tube for conducting experiments under conditions of high temperature as well as high pressure, which is not allowable with steel reaction chambers. Pyrolysis experiments were made at temperatures ranging from 900° to over 1,100° C. and through a pressure range of slightly less than 0.5 up to 104 atmospheres. It was shown that the yields of condensation products were not, as was hoped, increased by the use of high pressure but were on the contrary, decreased; further, the higher pressures tended to lower the yield of hydrogen. Observations as to the effect of temperature and rate of flow on the yields of both hydrogen and unsaturated hydrocarbons are in accordance with the conclusions of other investigators.

The Technique of Silk Dyeing

Detailed Instructions for Dissolving, Dyeing and After-Treatment

THE dyer of the silk fibre has at his disposal a larger range of dyestuffs than is available to the dyer of any other fibre, almost every group of synthetic dyestuffs being capable of satisfactory application on this type of fibre. The choice of appropriate dyestuffs is governed by the shade required, the purpose for which the silk is to be used and by any further manufacturing processes which the dyed material may have to undergo. This is emphasised by a new colour publication issued by Imperial Chemical Industries, Ltd., which deals with Acid, Basic, Direct (Chlorazol), Cordant (Solochrome) and Vat (Caledon and Durindone) colours in one volume, the accompanying notes and instructions being printed in English, French and German.

Of the various classes of dyestuffs employed for the dyeing of silk the Acid dyestuffs are probably the most widely used, combining as they do average brilliancy and fastness with ease of application. Acid dyestuffs give shades of fairly good to excellent fastness to light and rubbing but, with exceptions, are only moderate in their resistance to water, washing, and perspiration. The dyestuffs of the Chlorazol series are, as a class, slightly less brilliant in shade, but somewhat faster to water, washing and perspiration than the Acid dyestuffs and in addition are simple in application.

Fastness to Washing

Basic dyestuffs are used principally on account of their extreme brillancy of shade, but are only of moderate fastness to light; on the other hand, they are superior to the Acid dyestuffs in fastness to water and washing, particularly so when the dyeings are after-treated with tannic acid. Mordant dyestuffs and Vat colours of both the Caledon and Durindone series, despite their somewhat more complicated methods of application, find increasing use owing to the modern demand for fast dyed materials, and are indispensable where extreme fastness to washing is desired. Dyeings made with many of the Mordant and Vat dyestuffs will withstand a boiling-off process and thus can be used for dyeing yarns for incorporation in material which is subsequently to be degummed in the piece. In addition, many of these products are of outstanding fastness to light.

Tin weighting has the effect of diminishing the affinity of many Acid and Direct dyestuffs for silk, and the heavier the weighting the greater the decrease in the affinity of these dyestuffs. On the other hand, the tin salts act as a mordant for the Mordant dyestuffs and with few exceptions these products dye tin-weighted silk satisfactorily without any additional mordanting, although the shades in many cases are entirely different from those obtained on silk mordanted with chromium or aluminium salts. Generally speaking, the fastness to light of dyestuffs dyed on tin-weighted silk is inferior to that on unweighted silk.

Every precaution has been taken to make the classification in the fastness tables as accurate as possible, but it must be pointed out that, since it is impossible to test colours for fastness under all the variations of conditions which obtain in practice, the value of the tables is limited to service as a guide to the dyer in the search for dyestuffs to meet his particular need.

Acid Colours and Basic Colours

Acid dyestuffs are made into a smooth paste with cold water and then dissolved by the addition of boiling water. Condensed water is the most satisfactory for the purpose and should be used if available. Except in cases where a neutral bath is necessary, the material is worked for a few minutes in a bath containing boiled-off liquor to the extent of 1/10-1/5 or even ¼ of the total volume, acidified with acetic, formic, or sulphuric acid and set at 105°F. Owing to the variations met with in the degree of alkalinity of boiled-off liquor and the amount used, it is not possible to state the percentage of acid required. The condition of the dyebath is best judged by practical means, *e.g.*, the reaction towards litmus paper. The silk is then thrown up and the dissolved dyestuff added. The material is again worked for a few minutes after which the temperature is raised slowly to the boil and dyeing continued for ½ to ¾ hour.

Basic dyestuffs are first mixed with an equal weight of acetic acid (30 per cent.) and then dissolved by the addition of boiling water. When dissolving Auramine OS care should be taken that the temperature does not exceed 140°F., or a certain amount of decomposition may take place. Condensed water is to be preferred, but where hard water only is available it may be corrected before use by the addition of a little acetic acid. Dyeing is carried out in a bath containing boiled-off liquor broken with acetic acid, the manipulation being as already described for Acid dyestuffs, except that there is little need for the temperature of the bath to be raised beyond 140°F. (60°C.). In the interests of even dyeing it is advisable to add the dissolved dyestuff in several portions before commencing to raise the temperature, turning the yarn often and throwing up between each addition. Fastness to water and washing can be increased considerably by after-treatment with tannic acid and tartar emetic, the dyed material being given a few turns in a bath containing 2-5 per cent. of tannic acid, calculated on the weight of the silk, and set at 140°F., after which it is allowed to lie in the cooling bath for one hour or more. The material is then wrung or hydro-extracted and worked for half an hour in a cold bath containing 1-2½ per cent. of tartar emetic. In addition to increasing the fastness to water and washing this treatment has, in some cases, the effect of increasing the fastness to light, as in the case of Methylene Blues.

Direct Colours and Mordant Colours

Chlorazol dyestuffs are made into a smooth paste with cold water and then dissolved by the addition of boiling water; hard water should be corrected by boiling with a little soda. They may be dyed from a boiled-off liquor bath, as described for Acid colours, or from a neutral bath with the addition of Glauber's salts.

Mordant dyestuffs are dyed on silk which has been mordanted with metallic salts, usually aluminium or chromium. In all cases the mordanting baths are not exhausted and after strengthening can be used for further quantities of material. Certain mordant dyestuffs may also be dyed by the afterchrome process. In the case of alum mordant, the boiled off silk is worked for 20 minutes and afterwards allowed to lie overnight in a cold or lukewarm bath containing 10 gal. water, 6 lb. alum (free from iron), and ½ lb. soda ash. The material is squeezed and without rinsing worked for 20 minutes in 1°Tw. silicate of soda. The dyestuff is made into a smooth paste with cold water and dissolved by the addition of boiling water. The dyebath is set with 1/5 of the total volume of boiled-off liquor made slightly acid with acetic acid. The silk is entered at 100°F., and after working for 20 minutes the temperature is raised slowly to the boil and dyeing continued, just below the boil, for one hour. For the afterchrome process the boiled-off silk is entered into a cold bath containing the requisite amount of dyestuffs previously dissolved together with 10 per cent. Glauber's salt crystals and 1 per cent. sulphuric acid. The temperature is raised slowly to the boil and dyeing continued just below the boil for one hour; ½-2 per cent. of potassium of sodium bichromate are then added and the treatment continued for half an hour. In some instances it is preferable to commence dyeing with the addition of acetic acid, adding sulphuric acid later.

Vat Colours

The Caledon dyestuffs, which are derivative of anthraquinone, are generally faster than the Durindone dyestuffs, which are indigoid derivatives. The Durindone dyestuffs have a greater affinity for the silk fibre and consequently build up into heavier shades than do the Caledon dyestuffs. Both Caledon and Durindone dyestuffs are also supplied in powder form as well as a paste form, the strength of which is indicated in the product name, *e.g.*, Caledon Blue RC 300 powder is three times as strong as Caledon Blue RCS paste. The powder brands are wetted out with a solution of permanal W (6-8 oz. per gallon, or alternatively with a little alcohol or Turkey Red Oil PO, mixed to a smooth paste with cold water and then dissolved in the

manner described for paste brands. Soft water should be used for dissolving and dyeing the Caledon colours. If this is unobtainable it is advisable to add 1 lb of soda ash per 100 gallons of water. The recommended method of solution is in the so-called "stock vat," *i.e.*, in a concentrated solution in a vessel apart from the dyebath, using one-half of the indicated quantities of caustic soda and hydrosulphite and 1-1½ gal. of water to carry 1 lb. of dyestuff paste (single). 10-15 minutes are allowed for vatting to take place, and the solution is then added to the dyebath containing the remainder of the caustic soda and hydrosulphite appropriate to the particular dyestuff in use. The previously wet out silk is worked in the dyebath for ½-1 hour. On being removed the material is rinsed in cold water containing 4-8 oz. of hydrosulphite per 100 gal., wrung, oxidised by exposure to the air, soured in dilute acetic acid and again rinsed. The silk is then soaped for half an hour at the boil, rinsed well in warm water and scrooped. Two pound of soap in 100 gal. is a convenient strength for the soap bath. The Durindone dyestuffs are dissolved by the stock vat method. When vatting is complete the solution is added to the dyebath, previously set at the correct temperature for dyeing and sharpened with ¼ pint of caustic soda 53°Tw. and 4 oz. of hydrosulphite conc. powder. Dyeing and subsequent treatments are as described for Caledon dyestuffs, but as the leuco compounds are very soluble and oxidise slowly in the air, care should be taken that ample time is allowed for complete oxidation, the yarn being given several dry turns during this process.

Printing Processes for Cotton and Rayon Fabrics

Interesting New Developments

THE present popularity of printed styles for dress fabrics is particularly encouraging to those responsible for the technical production of such materials, and there are indications that considerable attention is being devoted to new possibilities in resist and discharge printing methods. Recently several new processes have been disclosed for producing a wider range of coloured effects using improved methods for printing with dyes of the fastest type.

The process described in Brit. Pat. No. 376,334 is a novel one in which coloured effects are obtained on cellulose acetate rayon fabrics by the use of discharge pastes which contain different discharging agents coloured with suitably resistant dyes, the printed effects being purposely allowed to overlap. In this manner it is possible to secure coloured discharges not only on a coloured ground but also simultaneously on a previously printed coloured discharge. Stannous chloride and zinc formaldehyde sulphoxylate (Decrolin) are the most useful discharging agents and a wide range of dyes dischargeable by one or the other or both agents are available. The following are examples of the various effects possible. A cellulose acetate fabric is first dyed with a colour which is dischargeable by both stannous chloride and the hydrosulphite compound, many of the azo insoluble and nitro-diarylamine dyes commonly used for the plain dyeing of acetate rayon being suitable. It is then printed with a stannous chloride discharge containing dyestuffs resistant to this reducing agent but dischargeable by zinc formaldehyde sulphoxylate, further dried, aged, and washed.

Afterwards the fabric is printed so that the designs overlap with a zinc formaldehyde sulphoxylate discharge containing dyes resistant to this substance, then aged, steamed if necessary, and washed. In this manner a coloured discharge is obtained on a coloured ground with the pattern produced by the overlapping print both on the ground colour and on the pattern produced by the stannous chloride discharge. The method may also be adapted to the resist style and employed in connection with aniline black; it also has application in the printing of cotton and cellulose rayon fabrics.

Avoiding Discharging Difficulties

Another printing process which is especially suitable for cellulose acetate rayon materials is concerned with fast vat coloured patterns. It is well known that the discharging of dyed acetate rayon is difficult mainly on account of the difficulty experienced by the discharging agent in penetrating the rayon fibres. Consequently, for such printing processes it is necessary to use dyes of relatively poor fastness for the ground shade, however fast may be the dyes applied with the discharge paste. Also the range of colouring matters available for the colouring of the discharge effects is restricted by the necessity of using powerful discharging agents. A method for avoiding these difficulties has now been found (Brit. Pat. No. 376,331). This new process is based on the discovery that an aromatic nitro compound when applied to the rayon fabric may satisfactorily act as a resist to vat dyes printed thereupon subsequently. Furthermore there are many dyes which can be added without decomposition to a vat dyestuff paste containing hydrosulphite compounds such as are necessary to fix the vat dye on the fabric. Thus it becomes possible to produce very fast coloured patterns on acetate rayon fabric in a relatively simple manner.

Among the mild aromatic oxidising substances which may be used as resists are nitrobenzene-meta-sulphonic acid, nitrotoluene-sulphonic acid, and nitro-anthraquinone-sulphonic acid; they do not affect a large number of the dyes which are available for colouring the vat dye printing pastes. Acetate rayon fabric is printed with one or more resist pastes composed of 50 per cent. gum arabic solution (55 parts), water (5 parts), methylated spirits (10 parts), and sodium nitrobenzene meta-sulphonate (30 parts), to which any suitable dye (for example, 1 : 4-dimethyl-diamino-anthraquinone or benzene-azo-1-phenyl-3-methyl-5-pyrazolone) may be added. It is then dried, steamed for one hour at 5 lb. pressure and over-printed with a vat dye paste composed of Ciba Scarlet G paste (or some other Vat dye)—(10 parts), 50 per cent. gum arabic (45 parts), methylated spirits (10 parts), potassium carbonate (12 parts), water (13 parts), and formosul (10 parts). The fabric is then dried, again steamed for five minutes, and the vat dye fully oxidised by passage through a 0.5 per cent. solution of potassium bichromate at 75° C.; it is finally washed and dried. Thus is obtained a multi-coloured pattern with an overprint of scarlet or other vat dye of excellent fastness.

Printing with Rapidogen Dyes

A third printing process to which attention may be drawn has been described by G. Bernardy ("Textilber," 1932, *13*, 17). This deals especially with the use of Rapidogen dyes which are improved types of the older Rapid Fast colours; they consist of stabilised mixtures of naphthols and diazo compounds which, after printing, can be made to react and form a colour (azo) by suitable methods. The Rapid Fast colours could be developed by simple steaming but the Rapidogen dyes are more stable and are better developed by passage through a boiling liquor containing an organic acid such as acetic or formic acid. Most of the colours are fast to washing, light, and chlorine so that the printed effects can be applied to high quality cotton and rayon fabrics. Bernardy gives full details of the printing methods. Indigosol (solubilised Vat dyes) colours may be printed together with the Rapidogen dyes and thus it is possible to secure colours not included in the Rapidogen range (blues and greens), and the printed fabric may be developed quite satisfactorily by the two-bowl squeezer method, using an acid liquor containing per litre: oxalic acid 10 grams, 90 per cent. formic acid 25 c.c., and Glauber salts 25 grams. It is desirable to include in the printing paste a small proportion of neutral chromate to assist the development. In the case of Indigosol blue dyes it is also desirable to develop further in a weak hot bath of sodium nitrite and sulphuric acid.

THE International Nickel Co. has developed, at its plant at Huntingdon, an improved technique for the forging of large diameter Monel metal bars, shafts, spindles, etc. It is now possible to obtain, in regular production, a uniform yield point of more than 70,000 p.s.i. (31 tons per sq. in.) on forged bars from 3 to 6 in. in diameter; elongation averages over 25 per cent. The improved properties will shortly be extended to a wider range of sizes.

Synthetic Lignin Investigations

By L. F. HAWLEY and E. E. HARRIS

This article, which is reprinted from the current issue of "Industrial and Engineering Chemistry" confirms and extends previous work which has been done on the conversion of wood carbohydrates to a lignin-like material. It suggests the hypothesis that the differences between hardwood and softwood lignins are really due to the respective preponderance of pentosan and hexosan units that enter into their formation.

In 1931 Hawley and Wiertelak ("Ind. Eng. Chem.," 1931, *23*, 184) reported the chemical analysis of wood that had been subjected to a temperature of 135° C. for several periods of time up to 8 days. The analysis showed a partial decomposition of carbohydrates in the wood and the formation of a material (roughly equivalent in amount) that was isolated along with the lignin. In order to investigate this lignin-like material further, it was prepared from Cross and Bevan cellulose and was thus obtained unmixed with the lignin of the original wood. The results of that investigation, confirming and extending the previous work, were presented at the spring, 1931, meeting of the American Chemical Society, but they were not published because meanwhile Sherrard and Harris ("Ind. Eng. Chem.," 1932, *24*, 103) and Ritter, Seborg and Mitchell ("Ind. Eng. Chem.," Anal. Ed., 1932, *4*, 202) had shown the possibility of serious error in the standard method used for lignin determination. Instead of publishing, the researchers decided to repeat the experimental work, using the improved method for determining lignin. Only the parts of the data from the first experiments that are required for comparison will be presented here.

Heat Treatment of Cellulose

In the present experiments large quantities of Cross and Bevan cellulose were prepared from white spruce and sugar maple by the method used in isolating the cellulose for its quantitative determination. Fifteen-gram samples were sealed in glass tubes and heated in a pressure-steam retort for 1, 2 and 8 days at 135° C. Duplicate runs were made, and, except in the few instances where a tube was broken accidentally, the figures in the table are the averages of two closely agreeing determinations, one from each duplicate tube. The slight gas pressure remaining in the tubes after cooling was relieved by breaking an end of each tube under water, and an approximate determination of the gas evolved was made. This gas was largely carbon dioxide, but under the conditions of the experiment no significant quantitative figure could be obtained. The amount of water formed during the heating can be calculated approximately from the difference in moisture content of the samples before and after heating.

The data in the accompanying table, when considered alone, indicate that the rate of the reaction with the spruce was much faster than with the maple cellulose. This difference, however, is probably caused by something else than inherent differences between the species. In the previous work a maple cellulose, prepared and treated in as nearly as possible the same way, gave 18.8 per cent lignin in 8 days, while the softwood cellulose (loblolly pine in this case) gave only 11.2 per cent. With any one lot of cellulose the rate seems to be the same in all runs as is shown by the relation between period of heating and extent of reaction, and the close checks in duplicate runs; but with different lots of cellulose the rates may be very different. Small amounts of impurities probably exert a considerable catalytic effect.

Synthetic and Natural Lignin

The later work has confirmed the general conclusions of Hawley and Wiertelak in regard to the decomposition of the carbohydrates in wood. The carbohydrates are decomposed with the formation of water-soluble and alcohol-benzene soluble substances that apparently are intermediate products in the formation of lignins. In the treatment of the hardwood cellulose, the pentosans were the first constituent to decompose, but the reaction was not carried far enough to determine whether ultimately other carbohydrates would be attacked. In the softwood cellulose, hexosans were decomposed even in the earlier stages of reaction.

The additional information obtained in this work with wood carbohydrates essentially free from lignin is based on examinations of the lignin isolated from the heated cellulose by comparison with the lignin similarly isolated from wood. As already reported by Stamm, Semb and Harris ("J. Phys. Chem.," 1932, *36*, 1574), the lignin produced by the heat treatment of maple cellulose had an ultra-violet absorption spectrum typical of the hardwood lignins. The particular sample examined for this purpose was one of the first lot not described in detail here for reasons previously given. The lignin formed amounted to about 18 per cent. of the treated material and, from the analyses, appeared to be derived largely from the pentosans in the cellulose.

Reducing Values

All these lignin samples, as shown by the method of their isolation and determination, are similar to lignin in wood in their resistance to 72 per cent. sulphuric acid. Furthermore, the isolated lignins dissolve readily in sulphite solutions after chlorination in the same way as lignin which is isolated directly from wood.

Ritter, Mitchell and Seborg, in a paper presented before the Division of Cellulose Chemistry, of the American Chemical Society, (March 28-April 1, 1932) have recently shown that spruce lignin, put into solution by chlorination and sulphites, has a reducing value which is 29.5 per cent. of that of an equal amount of glucose, and that maple lignin has a reducing value of 34.5 per cent. The lignin isolated from the 8-day treatment of spruce cellulose, when treated in the same manner, had a glucose equivalent, in reducing value, of 26 per cent.; the 8-day maple lignin had an equivalent of 31.0 per cent. The material prepared as described contains no methoxyl, but it can be methylated. Two methylations at 50° C. for 2 hours each gave a product having 7.0 per cent. of methoxyl, which is far below the value of 32.5 per cent. that has been obtained with natural lignin ("Ind. Eng. Chem.," 1932, *24*, 103). Attempts will be made to obtain a higher degree of methylation.

By four diverse methods of characterisation, the main product obtained in these experiments has shown a close similarity to the lignin obtained directly from wood, and the authors believe they are justified in calling it "synthetic lignin." At least they have prepared a product that, in its basic chemical characteristics, corresponds to lignin. In certain quantitative respects the correspondence may not be complete, but this should be expected, not only from the variability of natural lignins but also on account of probable impurities, such as intermediate or by-products, in the synthetic product.

By-Products and Intermediate Products

It is interesting to note how closely these experimental results correspond to the hypothesis of Schrauth ("Z. angew. Chem.," 1923, *36*, 149) on the constitution of lignin. He assumed a hypothetical intermediate product between glucose and lignin similar to 5-hydroxy-methyl furfural, 3 molecules of which condense with elimination of 6 molecules of water to form a compound of 5- and 6-atomed rings. This compound contains three hydroxyl groups in the central six-carbon ring that require hydrogenation for their removal and thus for the completion of the formation of a compound that accounts for the chemical characteristics of lignin. The water-soluble and alcohol-benzene soluble material, formed by the heat decomposition of the cellulose, corresponds to Schrauth's hypothetical intermediate product, and the amount of water formed corresponds roughly to the 6 molecules required. There is no indication in the present experiments of reduction of the hydroxyl groups except that carbon dioxide may be formed by the oxygen given off.

Although the water-soluble material, containing as it does intermediate products between cellulose and lignin, is of great interest, it has been given only a cursory examination. It has only a trace of reducing value even after hydrolysis with dilute acid. In acidification with mineral acids, a partial precipitation takes place and a part of the precipitate is resistant to chlorination and subsequent treatment with sul-

phites. The material resistant to chlorination may then be completely dissolved in 72 per cent. sulphuric acid. No conclusions are drawn from such fragmentary data, but it is merely suggested that further study of this water-soluble material seems to offer an important new field for research in the chemistry of both cellulose and lignin.

Although there are many slight qualitative differences to be noted between hardwood and softwood lignins, there are few well-defined quantitative differences. Perhaps the most characteristic are in the ultra-violet absorption spectra and in the reducing number. It has already been shown that the synthetic lignin made from hardwood cellulose, and evidently formed largely by the decomposition of pentosan units, has an absorption spectrum and a reducing value that correspond closely to a typical hardwood lignin, while the synthetic lignin made from a softwood cellulose, and evidently formed largely from hexosan units, has a reducing value corresponding closely to a typical softwood lignin. (The authors have not yet had opportunity to measure the absorption spectrum of such a sample.) This information leads directly to the hypothesis that the differences between natural hardwood and softwood lignins are due to the relative proportions of hexose and pentose units that have entered into their formation.

This hypothesis will be developed further as the next step in the research on synthetic lignins. It should be readily possible to prepare lignins from pure pentosans, pure hexosans, and known varying proportions of the two, and thus to establish the relation between the source and the characteristics of the product.

CHEMICAL COMPOSITION OF WOOD CELLULOSE HEATED FOR 0, 1, 2, AND 8 DAYS.
(Calculated in per cent. of weight, oven-dry.)

Composition.	White-Spruce Cross and Bevan Cellulose.				Sugar-Maple Cross and Bevan Cellulose.			
	Not heated.	Heated 1 day.	Heated 2 days.	Heated 8 days.	Not heated.	Heated 1 day.	Heated 2 days.	Heated 8 days.
Moisture	6·2	7·8	12·2	35·3	6·1	5·9	6·5	8·7
Hot-water sol.	0·0	15·4	17·8	21·7	0·0	4·3	4·8	3·0
Reducing sugar in hot-water sol.	0·0	0·17	0·24	0·0	0·0	0·19	0·14	0·06
1% alkali-sol., cor. for hot water	19·5	20·0	17·0	1·0	19·8	27·5	28·8	23·5
Alcohol-benzene sol.	0·0	11·8	15·5	19·2	0·0	2·4	2·8	2·2
Cross and Bevan cellulose	71·6	63·3	8·0	..	91·4	90·6	86·4	
Lignin	0·3	8·5	15·5	70·3	0·3	1·5	2·9	6·9
Pentosan	9·3	4·2	2·3	0·0	20·5	11·3	9·5	6·0

Coal Carbonised by Electricity

An American Experiment

A NEW use has been found by the Detroit Edison Co., of the United States, for off-peak electricity by employing it for carbonising coal. This undertaking serves some 500,000 consumers with electricity and about 11,000 with gas, and at certain times during the day off-peak electricity is available as a surplus over and above the consumers' demand. This electricity is being used for carbonising coal in both large and small retorts. The products obtained are said to indicate that the process is intermediate between high and low temperature carbonisation. The quality and yield of gas and coke closely resemble those of high temperature distillation, while the type of condensate or tar is akin to that produced in many low temperature processes.

According to a report which appears in "The Times Engineering Supplement," the coal is carbonised in a vertical cylindrical retort, down the centre of which is a tubular container of small diameter containing a column of coke breeze. A current of electricity is passed through this "fuse," heating it, and the heat is conducted to the adjacent coal and carbonises it. When this coal has become carbonised it becomes a relatively good conductor of electricity, thus serving to heat the coal in the retort by forming gradually a core of increasing diameter through which the electrical current passes. The process is thus carried on until the entire charge is carbonised. The rate of coking is 4 in. an hour. In construction the 30-ton retort is equipped with a refractory lining, the interior dimensions of the carbonising space being 40 ft. high by 6ft. diameter. The coke breeze fuse is connected at the top and bottom of the retort to electrodes, while several gas offtakes are situated about the periphery of the cylinder. During the process the gases pass out of the retort through the mass of uncarbonised coal and in doing so give up part of their sensible heat. Single-phase alternating current is used.

Test results on a 1½-ton retort with coal of 1 to 1½ cu. in. in a 10-hour run gave 10,700 cu. ft. per ton of coal gas of 564 B.Th.U. per cu. ft., the coke obtained representing 71.2 per cent. of the weight of coal and the yield of condensate being 11 per cent. The power used was 409 kW hours per ton. The gas on analysis was found to contain approximately 0.6 of carbon dioxide, 4.3 of illuminants, 62.6 of hydrogen, 7.1 of carbon monoxide, and 13.8 of methane.

Hydrogenation Autoclaves

A Special Laboratory Model

ONLY the fringe has been touched of the potentialities of high pressure hydrogenation of solid and liquid hydrocarbons. An immense field still remains to be explored, covering—in addition to the all-important temperature and pressure conditions—the influence of different catalysts, the degree of fineness of solid hydrocarbon components of the reaction, and the proportion of hydrogen relative to the latter. Necessity therefore exists for development plant specially adapted to laboratory tests which can rapidly furnish accurate data for transference to the manufacturing scale.

A specially designed laboratory model for this purpose is described by F. Laupichler in "Chemische Fabrik," August 24, 1932 (pp. 305-311). The bomb itself, which is equipped with stirring gear, is indirectly heated and horizontally bedded in the heating chamber. Since one of the main objects of the design is the attainment as far as possible of a uniform temperature throughout the reaction mass, the bomb is enclosed in the heating chamber throughout its entire length so that both the top head and the base plate are surrounded by the hot gases which enter the chamber tangentially and are withdrawn through a vent situated near the middle of the bomb. The heating gases are generated in a separate gas producer and are mixed with secondary air or superheated steam before entering at both ends of the heating chambers. The method adopted for temperature measurement of the actual contents of the bomb deserves special note. By way of a sleeve pipe built into the axis of the bomb, and which incidentally serves as a combined bearing and guide for the stirring gear, a thermometer or thermo-element can be introduced into the bomb and enables temperature measurements to be taken almost throughout the entire length.

Regarding the constructional material for bombs of this type, alloy steels which have been almost exclusively used include various grades of Siemens-Martin and Krupp's VA steels containing greater or smaller percentages of chromium and nickel. The V2A steel of Krupp, for example, has the following percentage composition: Fe 71, Ni 8, Cr 20, Mn 0.26, Si 0.29, carbon 0.22 per cent. Valuable properties imparted by the high content of nickel and chromium include high mechanical resistance to temperature changes as well as chemical stability.

Restrainers in Leather Dyeing

By D. WOODROFFE, M.Sc., A.I.C.,
(Head of Leather Dept., Northampton College of Technology).

LEATHER is one of the most variable materials known. Each skin has an individual character, and it is not surprising, therefore, that different skins dyed in the same dye-bath and for the same length of time come out of the dye liquid with different shades. Six different shades are quite common in one pack of goods. In addition to this each skin shows variation. The butt portion is tight-textured, the flanks and offal are very loose-textured, the neck and shoulder portions differ from both parts, and the backbone differs from all of them. It is not surprising, therefore, that great difficulty is experienced in producing level shades, and even the simplest tannage for the dyer, *e.g.*, vegetable tannage; other tannages are more difficult.

The acid dyes give the most level shades on vegetable-tanned leather, but even some of these fail to give level colours; acid blues, violets and greens present special difficulties owing to their high strength, and the rapidity with which they are absorbed by the leather. It is well known that any means of restraining the absorption of the dyestuff by the leather facilitates the production of more level dyeings. The temperature of the dye liquor can be reduced, or weak dye solutions can be employed, but these are very slow methods, and do not lend themselves to modern methods of production, in which every effort must be made to ensure the greatest possible efficiency. The greatest difficulty is experienced, however, in the production of pale shades on leather. Most of the pale or pastel shades are obtained by shading some of the lighter coloured dyestuffs with saddening agents, such as greens, blues and blacks. Since these have such a great affinity for the leather, and a still greater affinity for defects on the grain surface, it is almost impossible to obtain level dyed pastel shades without recourse to such materials. It is surprising how such hides accentuate even the slightest variation in the texture of the grain surface, and slight faults which would never be apparent in any other shade will sometimes become pronounced in pastel shades.

The Function of a Restrainer

In all these cases, the only way out of the difficulty is to employ a restrainer, some substance which will slow down the affinity of the dyestuff for the leather, and so provide for a more steady combination of the leather and dyestuff. Soap has been used for this purpose. In a number of recipes for dyeing pale shades on lining sheep and "Persians," the use of 2 oz. of Castille soap per dozen skins is suggested as a preliminary process to the dyeing. The mordanted skins or retanned leather is entered into the dye paddles containing the hot water, and the soap solution added immediately. The skins are treated for twenty minutes in this before the addition of the dye solution is commenced. It is claimed that the soap is absorbed to a greater extent by the weak grain or defective portions of the grain of the leather and that the absorbtive capacity of such portions for the dyestuff is thereby diminished. In consequence, when the dye solution is added, the defective grain portions do not absorb the dyestuff with the avidity which they would exhibit if the soap treatment had been omitted.

Some leather dyers fat liquor the leather before dyeing, *i.e.*, they run the leather in an emulsion of soap and oil or of a sulphonated oil. This treatment reduces the affinity of the defective parts of the grain since they fix more of the oil or fat than the sound portions of the grain. Another method of restraining the absorption of the dyestuff consists in the use of some insoluble matter in the dye liquor. The use of insoluble powders or carriers is well known in colloidal processes and this particular case is not unrelated to it. French chalk, colloidal clays, china clay and other pigments are sometimes added to the dye bath in which the leather is being dyed. This addition of pigments is very frequent in the dyeing of pale shades on leathers which will not require any subsequent finish on the grain side. It has been observed that their addition to the dyebath when dyeing greys even of the palest shades, results in a more level shade and a diminished accentuation of the skin defects.

Chemical restrainers have been employed for a long time in textile dyeing. The use of Glauber's salt is frequently recommended with direct dyes and with acid dyes in order to induce more gradual and level dyeing of the material. Many leather dyers use ammonium acetate or ammonia in dyeing suede or velvet leathers for the purpose of improving the penetration. The ammonia or its acetate has the effect of neutralising or reducing the acidity of the dye liquors which in turn reduces the amount of free hpdrolysed dye acid. Since there is very little free dye acid, the leather cannot fix a further portion of the real dye. In this way the dyeing of the leather is rendered very gradual, more level shades are obtained and incidentally greater penetration is secured.

Synthetic Tannins

There are certain comparatively new materials which can also be employed as restrainers. The synthetic tannins provide a very useful means of ensuring greater regularity of colour, particularly on pale shades. The first synthetic tannins which were discovered were prepared from aromatic phenols and naphthalene by first solubilising these materials by combining them with sulphuric acid to form their sulphonic acids, and afterwards condensing the sulphonic acid with formaldehyde. An alternative method is to condense the aromatic phenol with the formaldehyde first and afterwards to solubilise the product by sulphonation. Since the discovery of these componds a very large number of different synthetic tannins have been prepared.

The chief use of synthetic tannins in the leather trade has not developed on the lines of a pure tannage with synthetic tannin alone, but as a retanning agent for completing the tannage of partially tanned leathers, and for improving or bleaching the colour of such leathers. Practically all the vegetable-tanned leathers are retanned before dyeing, although sometimes this retannage is not carried out primarily as a retannage, but chiefly as a mordanting or freshening process, to facilitate the dyeing. It was found that such retanned leathers on which synthetic tannins had been employed, required a larger amount of dyestuff than if the synthetic tannin had been omitted. Tests were carried out on leathers which had been so treated, and it was shown that most acid dyes had a good affinity for the leather, although the affinity was, perhaps, slightly reduced, but that basic dyes would not dye the leather evenly.

Synthetic tannins have now become well recognised in connection with the dyeing of pale shades and the synthetic tannins function as restrainers. Very few of the dye firms appear to have recognised this property, although the largest firm of dyestuff manufacturers in the world recommends the use of some of its own synthetic tannins for dyeing pale shades, as the following recipes indicate:—

Light Beige	0.3 per cent. Azo Acid Brown for Leather. 0.2 per cent. Tamol NNO.
Dove Grey	0.3 per cent. Acid Alizarine Grey G. 0.5 per cent. Tamol NNO.

Aromatic Sulphuric Acids

G. E. Knowles, ("J. Soc. Leather Trades Chemists," 1930, 562) summarised some experiments on the dyeing of synthetic tanned leathers in the following words:—"Acid dyes which are suitable for vegetable-tanned leather show a remarkable variation when applied to synthetic tanned leather, some dyes readily giving deep shades, whilst some are only moderately good and others scarcely tint the leather no matter what amount of dyestuff be used." Whilst Mr. Knowles is more concerned in the above article with the possibilities of dyeing leather tanned with synthetic tannins, sufficient indication is given of the restraining action of these tannins on the fixation of certain acid dyes by leather tanned with them. More recently, a number of aromatic sulphonic acids have been put on the market, which exercise a similar restraining effect on the dye fixation and thereby conduce to more level dyeing and improved penetration. Most of the restrainers of this type are at present of foreign manufacture and most of the improvements in this connection are unfortunately due to the researches abroad.

The Italian Dye and Pigment Industries

A Survey of Present-Day Conditions

The following survey of current conditions in the Italian dye and pigment industries is compiled from information furnished by the Instituto Nazionale per L'Esportazione, in the July issue of its Bulletin, "The Italian Exporter."

THE dyestuff industry, already of considerable importance in Italy at the close of last century, attained its maximum development in the post-war years with the rise and success of the branch devoted to the production of those synthetic organic dyestuffs now so essential to the dye industry. This rapid growth has not only made the home market almost entirely independent of foreign supplies, but has also allowed of a steadily growing export trade.

By distilling coal tar oils and washing the gases given off by coke ovens and gas furnaces, Italian industry secured in 1930 large quantities of light oils (8,756 metric tons), intermediate oils (6,372 tons) and heavy oils (9,760 tons), from which 4,559 tons of rectified benzol, 2,910 tons of naphthalene and 131 tons of phenol were obtained in 1930. Notwithstanding recent progress, the output of these raw materials is, however, still insufficient to meet the demand of the home market.

The Dyestuffs Industry

The leading intermediate products manufactured in Italy are aniline oils, of which 1.3 million kilos are now produced, chlorobenzol which utilises part of the chlorine obtained in the manufacture of electrolytic caustic soda, binitrochlorobenzol and binitrophenol obtained from chlorobenzol, hydrochloric acid, naphthol and benzidine obtained by an exclusively Italian process, paranitroaniline, tolidine, alpha naphthalylamine, gamma acid, naphthoic acid and sulphanilic acid, naphthalic anhydride, anthraquinone, etc. The most important plants are those at Cengio (Savona), originally equipped for the manufacture of high explosives and subsequently adapted to the distillation of intermediate products and aniline oils, Cesano Maderno and Rho, in the province of Milan. According to the returns secured by the National Fascist Federation of the Chemical and Allied Industries, the output of intermediate products in 1930 was 7,000 metric tons; in 1931, 6,500 tons. There is a steady average export of some 2,000 tons per annum.

The rapid growth of the intermediate product industry has been accompanied by a similar expansion in the manufacture of synthetic organic dyestuffs, some of which are already produced in quantities which leave a notable margin for export. The Italian industry now produces most of the more important items for the whole series of synthetic dyes. The largest output, however, is that of sulphide dyestuffs, including black, which in recent years accounts for nearly 60 per cent. of all the synthetic dyes manufactured in Italy. The manufacture of synthetic indigo started in 1926 at Cesano Maderno (Milan); that of navy blue and thyanthrene black, which followed in 1927 at Conca Fallata (Milan), marks the first important step forward in the manufacture of vat dyes. There are only eight synthetic indigo factories in the whole world. The potential output of the Italian plants at Cesano Maderno, rising to nearly 6,000 kilos of indigo in cakes, far exceeds the demand on the home market, estimated around 400,000 to 500,000 kilograms per annum. Consequently large quantities of synthetic indigo are exported to China, British India and Japan. On the other hand, the Italian output of dyes obtained from anthraquinone is still quite small. The total output of synthetic organic dyestuffs in 1930 was 5,800 metric tons and in 1931, 5,400 tons. There are some ten Italian factories of synthetic dyestuffs. The more important are the five in the province of Milan, and those at Turin and Bergamo.

Mineral Colours

The wealth of pigments in the Italian sub-soil has made it possible to exploit large deposits in many localities, yielding several varieties, consisting chiefly of argilacious earths more or less deeply stained by iron oxide, such as boles, ochres, siena earth, green earths, etc. The most important deposits are those in the province of Grosseto, whence yellow earths and calcined boles of several shades are obtained; in the province of Perugia at Gauldo Tadino where santo white is obtained by calcinating carbonate of lime, and red pigments by treating the limonitic oxides of Monte Penna. In the province of Rome, at Subiaco, ochres are obtained which when calcined yield several shades of mineral colours: chrome, yellow, dark yellow, light and dark reds, blacks, umbers; santo white is also obtained by grinding white limestone. At Carloforte in the province of Cagliari, yellow, red and violet ochres are obtained from the manganese mines; in the province of Verona green pigments and natural ochres are excavated, which, when ground and calcined, yield yellow and red ochres. In 1913 the total yield of these pigments amounted to 7,513 metric tons; in the first post-war years it averaged 10,000 metric tons per annum; in 1930 and 1931 10,300 and 9,900 metric tons respectively. Most of the output comes from Venetia. The second place is held either by Sardinia or Tuscany, their respective importance varying from year to year; they are followed by either Piedmont or Latium. Some ten large firms specialise in the preparation of the raw pigments.

Green Earth

Green earth, more generally known as "Verona green," is found in the best qualities on the slopes of Monte Baldo in the province of Verona; in other localities it is of inferior quality. That excavated in the Tyrol and the Trentino is opaque in colour, though some of it approaches the olive green shades of the Berona pigment. There are large deposits of yellow ochres and boles in Italy, but of these earths are deficient in sesquioxide of iron. Those most in demand and most valued come from the districts lying between Siena and Grosseto, and from Carloforte (Cagliari); they are also found in large quantities mixed with sandstone in the province of Verona. At least one third of the output is calcined, and placed on the market under the name of red earth. Yellow ochres are also found in the form of hematite and limonite in the Island of Elba (Leghorn); these are calcined and sold under the name of burnt sienna. For some little time past the quarries in the province of Viterbo, from which yellow ochre similar to that of Verona is obtained, are again being worked, but the most important output is that of the yellow ochres and boles of Siena and Grosseto, all alike sold under the generic name of terra di siena. These ochres are generally placed on the market raw, while the boles are calcined. The ochres of Caloforte in Sardinia are also famed in Italy for their depth of colour, and are excavated by modern scientific methods. Other pigments quarried in Italy include natural red and brown ochres.

Manufactured Pigments

Until some thirty years ago Italy was almost entirely dependent on foreign supplies for manufactured pigments; now not only has she ceased to import, but the home industry is gaining recognition on the export market. The total Italian output now fluctuates around 18,000 to 19,000 metric tons per annum, manufactured in over 100 factories scattered throughout the country, many of which also prepare paints, while others make the colours mostly for their own use or as ancillary products.

White lead has been made in Italy since 1860. The industry arose and attained its largest development in the province of Genoa, where in 1880 there were 13 factories with an annual otput of 1,600 metric tons. Of the many processes of manufacture the chamber process and that of precipitation are those used in Italy, the former being preferred for technical reasons. There are now 7 factories engaged in the manufacture of white lead, mostly located in the province of Genoa, followed by that of Milan, and by the provinces of Naples and Cagliari. The total output amounted to 3,420 metric tons in 1926; 2,913 tons in 1929 and 1,870 tons in 1930.

The manufacture of oxide of zinc inItaly dates back to 1906 when the scientific working of the mines at Iglesias

(Cagliari) for the zinc ore contained in their blendes and kalamine, and for the lead contained in their argentiferous galena, gave rise to the erection of the first plant for the manufacture of zinc white obtained direct from kalamine. The substance thus obtained was, however, of a pale straw colour, although extremely opaque. Subsequently, other important plants were erected to prepare the oxide from metallic zinc and zinc ashes. Seven factories, employing some 200 workers, are now engaged in Italy in the manufacture of zinc white. Most of them are located in the province of Genoa, followed by Turin and Milan and by the provinces of Perugia and Cagliari. The total output, which in 1913 amounted to 1,720 metric tons, stood at 4,815 tons in 1930. Titanium white manufacture started in 1925. In a few years time this product, now made only by one Milanese firm, which treats titanium ore with sulphuric acid, has come rapidly to the fore and the output rose to 1,400 metric tons in 1930. The total output of lithopone amounted to 3,500 metric tons in 1926, 2,475 tons in 1929, 2,760 tons in 1930.

Paints, Enamels and Varnishes

Large quantities of common oil paints, and of the special varieties of enamel paints, lakes, varnishes, nitrocellulose paints, etc., are made in Italy. The use of enamel paints was first introduced into Italy in 1890, when a factory was opened in Rome. Since then the industry has spread and is now in full development. The chief factories are in the provinces of Milan, Genoa, Trieste, Turin, Rome, Pisa and Padua, in the provinces of Bergamo and Como. Twenty years ago Italy had to import the varnishes required, but this branch of industry is now making rapid progress. There are several varnish factories, the more important being located in Milan, Genoa, Brescia and Bergamo. The manufacture of cellulose paints and enamels has also taken root, and they are now turned out by 25 factories located for the most part in Piedmont, Liguria and Lombardy, with a potential output adequate to meet home requirements and leaving a considerable margin for export. Mention must also be made of the important output of lakes, more especially aniline lakes, prepared in all varieties of colours. The total Italian output of paints and varnishes in 1930 was 10,000 metric tons, and in 1931, 20,500 tons

The chief consuming markets for Italian synthetic dyestuffs are British India, China, Japan and France. The chief importing countries of natural pigments, unground or ground sifted, washed and otherwise prepared, are the United States and Great Britain, followed by Argentina and Germany. White lead is exported mainly to Great Britain, Holland, Greece, Turkey and India; zinc white to Egypt and Germany; titanium white to Great Britain. Switzerland is much the most important market for lithopone; minium and litharge go mostly to Germany, followed by Holland and British India; cinnabar and vermillion go to the United States; ultramarine to Argentina, Hungary, Great Britain and Canada. Exports of lamp-black, bone-black, etc., go chiefly to Argentina, Germany, Switzerland, Holland, Spain, etc. The chief importing countries for oil and enamel paints, etc., are Egypt, Greece, Turkey and France.

Under the guild organisation of the Italian State all producers of dyestuffs, pigments, mineral colours and paints are affiliated to the National Fascist Federation of Chemical and Allied Industries (Via delle Muratte, 43 Rome), which organises them in two groups, one for synthetic organic dyes, and the other for mineral colours and paints. Besides its syndical duties, this organisation deals with the economic problems affecting the Italian dye and paint industries.

Fertiliser Trade in Germany

Position Reviewed at Semi-Annual Congress

CONSUMPTION of artificial fertilisers in Germany—the world's largest consuming market—in the nine-month period ended March 31, 1932, declined by 14 per cent., 18 per cent. and 23 per cent., respectively, as compared with the corresponding period of 1930-31, according to figures presented to the semi-annual congress of fertiliser delegates meeting at the Prussian Ministry of Agriculture. The 14 per cent. decline in nitrogen sales is traced to slack demand in East Prussia, Schleswig-Holstein, and certain western provinces, especially engaged in raising livestock.

In the year ended May 4, 1932, the decline in artificial nitrogen sales to domestic agriculture was slightly less, as compared with the previous year, namely, 12 per cent., according to the Nitrogen Syndicate. Commodities least affected in sale were ammonium nitrate chalk (produced by Ruhr synthetic plants) and calcium nitrate (produced by the I.G.'s "Leunawerke"). Most affected, however, were "Leuna" and "Montan" saltpetre (also produced by Ruhr synthetic plants) and artificial urea. The sustained popularity of ammonium nitrate chalk and calcium nitrate was ascribed to technical perfection of manufacture and the producers' ability to supply the farmer with a salt that is easy to handle and to spread. In discussing this trend, a representative of the nitrogen syndicate stated that implement manufacturers should endeavour to improve the designs of fertiliser-spreading machines, in order to properly distribute the new high-analysis materials.

The 18 per cent. decline in phosphoric acid fertilisation in the nine-month period ended March 31, 1932, results partly from reduced yields of by-product basic phosphate slag by the German steel industry. The Union of Basic Slag Producers reported annual sales so far as 17 per cent below those in the previous year. The decline from 1929-30 was 34.6 per cent. The nine-months decline in domestic potash sales was 23 per cent., but the potash syndicate delegate submitted figures showing that domestic potash sales declined by 16 per cent. in 1931-32, as compared with the year previous, and by a total of 25.8 per cent. in two years from the 1929-30 peak. Decline in potash consumption in German agriculture affects widening areas. Special depression in demand is evident in the distressed areas here, and by farmers engaged in raising livestock.

Trade with Yugoslavia

Present Economic Conditions

ACCORDING to a recent report on "Economic Conditions in Yugoslavia," issued by the Department of Overseas Trade, there have been so many changes in the economic situation as to render it difficult to present a full appreciation of the various stages. The situation was affected by the measures taken for the stabilisation of the dinar in May, 1931, the cessation of reparation deliveries, the change from the dictatorship to a parliamentary system in October, 1931, the introduction of a grain monopoly and the effects of the departure of the pound from the gold standard. The general financial condition of the Government and of the country has been weakened and measures have been under consideration to relieve the burden of direct taxation. Revenues have, however, fallen to such an extent as to render it unlikely that any marked reduction will be found possible.

Roughly speaking, the balance of trade as represented by imports and exports has not varied greatly although the volume has steadily shrunk during the past years. Since April, the increasing stringency of the currency regulations has imposed a further hindrance to imports and there is unfortunately little reason to hope for any improvement in the situation as regards foreign trade in the near future. During 1931 the United Kingdom increased its percentage of the total imports into Yugoslavia to 6.57 as against an average of 5.74 in the previous three years. This increase is largely due to a short boom following the depreciation of the £ sterling in the autumn. An obstacle to the extension of United Kingdom trade in the form of reparation deliveries in kind from Germany has now been partly removed and there is some reason to hope that, when conditions improve, the United Kingdom may play a greater part than before in Yugoslavian trade. All the chemical industries are working at only a small percentage of their capacity. The leather industry has been working at half its capacity and serious losses have been experienced. The glass industry is said to be working at below 10 per cent. of its capacity. The cement industry which works largely for the export trade has maintained its production until comparatively recently, but the fall in prices has been felt seriously. The enamel ware industry, which is now well developed, has also declined seriously. The sugar industry has been obliged to reduce its output owing to reduced consumption of sugar in the country.

The Coke, By-Products and Manufactured Fuel Trades

Preliminary Statistics from the Fourth Census of Production, 1930

FIGURES given in the preliminary report of the Fourth Census of Production, 1930, relative to the Coke, By-Products and Manufactured Fuel Trades, cover 133 establishments. Returns for 1930, however, are outstanding from firms that employed about 250 persons in 1924, or 1.2 per cent. of the total number recorded for that year by all firms employing more than 10 persons.

The principal aggregate figures for 1930 and 1924 are summarised in the following table :—

	Unit	1930	1924
Value of goods made and work done (Gross output)	£'000	16,550	26,296
Costs of material used	,,	12,941	20,875
Net output	,,	3,609	5,421
Average number of persons employed ..	No.	16,217	20,289
Net output per person employed ..	£	223	267
Mechanical power available :—			
Prime movers	H.P.	63,149	68,897
Electric motors driven by purchased electricity	,,	30,593	33,471

The quantity of foundry coke made in 1930 was 11,616,000 tons, valued at £9,664,000, as compared with 12,782,000 tons, valued at £16,810,000 in 1924. There was thus a decline of about 9 per cent. in production in the later year. The output of manufactured fuel in 1930 was also about 9 per cent. less than in 1924, the quantity made in the later year being returned as 1,144,000 tons, valued at £1,185,000, and in the earlier year as 1,255,000, valued at £1,751,000. It will be observed that the output figures returned for 1930 in respect of both foundry coke and manufactured fuel are in substantial agreement iwth those recorded for that year in the "Annual Report of the Secretary for Mines" (11,514,021 tons and 1,130,962 tons, respectively), the small excess in the Census figures being probably due to the fact that the returns did not invariably relate to the calendar year.

Tar Distillation Products

The appended table shows the values and quantities of coal tar, coal tar products, etc., made for sale in 1930 and 1924 at coke ovens and by-product recovery plants, including those operated in conjunction with blast furnaces. It should be borne in mind, however, that the particulars shown represent only a part of the total output in Great Britain. Coal tar products valued in all at £4,064,000 were recorded for 1930 by tar distillers who made returns on schedules for the chemicals, dyestuffs and drugs trades, the corresponding figure for 1924 being £4,885,000. Ammonium sulphate is manufactured in a number of trades, and certain information regarding the quantity produced in 1930 and 1924 was given in the report on the fertiliser, disinfectant, glue and allied trades. Important quantities of coal tar and its derivatives are also produced at gas works, but particulars of the output of these establishments are not yet available for 1930.

With regard to sulphate of ammonia, benzol, carbolic acid and toluol, the stardards of strength indicated in the table and the footnotes thereto are those at which manufacturers were asked to return particulars of the quantities made by them. At the 1924 Census these standards were not adhered to in an important number of cases, and the particulars of quantity shown for these products should not be taken as more than approximations to the actual quantities made in that year when expressed in terms of the standards indicated.

Foundry Coke Statistics

The average selling value of foundry coke, as shown by the returns, was 16.64 shillings per ton in 1930 and 26.30 shillings per ton in 1924. With regard to manufactured fuel, the average selling value was 20.72 shillings per ton in 1930 and 27.90 shillings per ton in 1924. The average values were thus lower in 1930 than in 1924 by 37 per cent. in the case of foundry coke and by 26 per cent. in the case of manufactured fuel.

The exports of foundry coke in 1930 amounted to 1,547,000 tons, or 13.3 per cent. of the total production in that year, as compared with 1,848,000 tons in 1924, or 14.4 per cent. of the total production. Retained imports were negligible in both years, being only 121 tons in 1930 and 122 tons in 1924. Exports of manufactured fuel were 1,006,000 tons, or 87.9 per cent. of production, in 1930 and 1,067,000 tons, or 83.7 per cent. of production in 1924. Retained imports amounted to 245 tons in 1930 and 387 tons in 1924, and it is understood that these imports consisted to a considerable extent of fuel not made from coal, being thus quite different from the coal briquettes, which constitute the manufactured fuel produced in this country.

VALUES AND QUANTITIES OF PRODUCTS MADE FOR SALE IN 1930 AND 1924.

Product.	1930 Quantity.	1930 Value.	1924 Quantity.	1924 Value.
Tar :—	Th. tons.	£'000.	Th. tons.	£'000.
Crude	422·5	620	503·4	1,437
Refined	94·4	251		
Ammoniacal liquor	5·8	9	12·7	15
Coal tar products :—				
Pitch	91·3	161	157·4	436
Sulphate of ammonia (20·6 per cent. nitrogen) ..	173·1	984	186·2	2,274
Benzol :—	Th. gal.		Th. gal.	
Crude	16,904	771	38,061	1,830
Refined	20,211	1,475		
Carbolic acid :—			Th. cwt.	
Crude (in terms of 60's) ..	131	13	27·1	20
Cresylic acid	206	19		
Naphtha (crude)	788	40	Th. gal. 1,830	88
Naphthalene (crude), excluding naphthalene oil° ..	Th. cwt. 167·4	35	Th. cwt. 191·5	54
Tar oil, creosote oil, anthracene oil and other heavy coal tar oils	Th. gal. 15,095	179	Th. gal. 17,756	524
Toluol (in terms of 90's) ..	837	75	320	25
Other tar distillation products (including anthracene)°	..	45	..	195
TOTAL VALUE°		4,677	..	6,898

Jubilee of J. W. Towers & Co. Ltd.

Fifty Years' Progress

HALF a century devoted to the selling of scientific apparatus and pure chemicals has given J. W. Towers and Co., Ltd., of Widnes, an extensive accumulation of knowledge which the firm places at the disposal of their customers. According to the Jubilee number of "The Towers Messenger," the manufacture of pure acids was begun in 1887. The firm, which was founded August 18, 1882, now use stills of their own design, making acids of unequalled purity. Their best nitric acid, for example, is so pure that contact with glass is detrimental, and for users to whom this matters they send it out in wax-lined bottles. The glass blowing department was started in 1915 to make lampblown apparatus which had previously been supplied by Continental manufacturers. All the workers are British. Since its commencement this department has produced many millions of articles, the majority of which would otherwise have been imported. The graduating department commenced work soon after the glassblowing department and is installed with the most modern dividing and figuring machines and special calibration apparatus. Quite recently graduated apparatus of guaranteed accuracy at very moderate prices was introduced as a result of improved methods of manufacture.

Letters to the Editor

The late Sir William Pearce

SIR,—May I be allowed to add a personal footnote to the admirable memoir of Sir William Pearce which appeared in your issue of September 3. I enjoyed the privilege of friendship with Sir William Pearce for many years, first in the Lobby of the House of Commons, and during the last years of his life in his home at Walmer. He was one of the best-liked men who ever sat in Parliament. He never held office in any Government, and indeed it is doubtful if he ever wished to. There was so little of the self seeker in him that he felt he could render better public service as a private Member than in the limelight of the Treasury Bench. He saw men of less ability raised to that temporary eminence, but he bore them no grudge inasmuch as his own Parliamentary position gave him an influence beyond that of many Ministers. It was his fate to sit in the House of Commons that dragged its weary length through the 4½ years of the great war, and his wide knowledge of the chemical industry enabled him to be of great assistance to the State during the period in which the war factories were being equipped for the production of high explosive shell on an unprecedented scale. As a fine courtesy and charm of manner were joined to a shrewd political sense, he naturally became one of a sort of unofficial panel to which Ministers looked for a chairman when important committees had to be formed. In short, his was the type of English public man which foreign legislators find it almost impossible to reproduce.

Sir William Pearce had been a great cricketer in his youth, and after he had settled down at Walmer in a beautiful house commanding a magnificent view of the shipping in the Downs, he took pleasure in the matches which were played on the ground of the Royal Marines Depot close by. Towards the end of his life he was seriously handicapped by failing eyesight, but he allowed nothing to disturb his instinctive urbanity. He was elected to the Reform Club many years ago and paid his old friends there a weekly visit until a very short time ago. You, Sir, have paid your tribute to the chemist; I am proud to pay mine to a good Parliamentarian and firm friend, whose memory will long be a fragrant one.—Yours faithfully,

GORDON ROBBINS.

11 North Square, N.W.11.
September 6, 1932.

A British Week in Sweden

Extending Business Relations

UNDER the patronage of the Crown Prince of Sweden, a British Week is being arranged in Stockholm, Gothenburg and Malmo in connection with the official visit to Sweden of the Prince of Wales and Prince George. The Swedish celebrations will follow the visit of the Prince of Wales to the British Exhibition at Copenhagen, to which reference has already been made in THE CHEMICAL AGE. According to "Nya Dagligt Allahanda," an evening paper published in Stockholm, the leading Swedish commercial associations have for some time expressed the wish that the British Exhibition should be moved to Stockholm in some way or other. It has been urged that Swedish imports from Great Britain should be increased, and it has been pointed out that Great Britain is Sweden's best customer and helps Sweden in every way possible, and therefore it should buy more British goods, instead of, as is the case at the present moment, buying chiefly from Germany. The Swedish exports to Germany are only 25 per cent. of the German exports to Sweden, and business people have expressd the viewpoint that Germany does everything possible to decrease her imports from Sweden, whilst the position is entirely different as far as Great Britain is concerned.

It has been decided to invite British exhibitors at Copenhagen to Sweden in order to extend the friendly feelings that exist with Swedish business people and to enable British visitors to become better acquainted with the Swedish market. Excursions are being arranged by some of the business associations closely connected with export trade to England, and demonstrations and pictures will be shown and opportunities given for general discussions and friendly gatherings.

New Dyestuffs

An Addition to the I.C.I. Range

SOLOCHROME YELLOW CS is a new addition to the range of chrome mordant dyestuffs made by Imperial Chemical Industries, Ltd. It is of interest wherever fast chrome yellows are normally used and it is eminently suitable for the production of fast yellow and compound shades on loose wool, slubbing, and yarns. The colour possesses very good general fastness properties, particularly so with regard to fastness to light, milling and potting. It is not recommended for use in those types of circulating machines where the material is packed tightly and dyed in comparatively short liquors, but perfectly satisfactory results are obtained on loose wool in machines of the "Simplex" type, where reasonably long liquors and loose packing are employed. As a dyestuff it is applicable to natural silk by the afterchrome and chromium chloride mordant methods, the former process giving the brightest shades which possess excellent fastness to water and washing. It is also suitable for direct printing on cotton, viscose and natural silk and is, in certain cases, suitable for use as a ground shade for the production of white or coloured discharge effects. Solochrome Yellow CS possesses very good affinity for the wool fibre and, when applied by the method described, the rate of absorption of the dyestuff is uniform between 105° F. and the boil. It is advantageous to raise the temperature of the dyebath fairly slowly to the boil during the dyeing operation. The addition of a little formic or sulphuric acid towards the end of the dyeing process exhausts the dyebath completely and ensures maximum development of the shade during the subsequent chroming process.

Chemical Resistance of Lining

Values of Hard and Soft Rubber Materials

IN a paper read recently before the American Society for Testing Materials on the subject of "Chemical Resistance of Rubber Linings," H. E. Fritz and J. R. Hower stated that the value of rubber as a chemical resistant depends on chemical inertia, physical properties and intelligent combination with other materials. Compounds are designed for specific uses, and can be bonded to other materials so as practically to become integral with them. Unvulcanised rubbers have been used to a limited extent, but the bulk of rubber used in chemical service is vulcanised, or a combination of soft and vulcanised. For known conditions, such rubber can be compounded to resist long-time submersion in organic acids, salts or alkalies, and to some extent in organic materials such as less active acids, various alcohols, some vegetable oils and fruit juices.

For most materials 150° F. is the maximum temperature, with a few of the more chemically active limited to 100°, as oxidation, diffusion and absorption are aggravated at higher temperatures, so that life of the rubber is materially shortened. When long life is a minor consideration, exposure to chemicals is intermittent or contamination of the product handled is not a serious matter, soft rubber or higher temperatures may be and often are used.

Pure water, especially at high temperatures, affects rubber more than do most of the chemicals handled, molecular diffusion causing a swelling of soft rubber and the dissolved oxygen hastening deterioration. Oils produce a like effect. Hard rubber is better to resist absorption and swelling. Vulcanised rubber, chiefly sulphur and rubber, has its resistance increased as the sulphur content is made larger. If vulcanising is carried to the hard rubber stage, rigidity is greater,, machining is easier, electrical resistance is increased, but at the sacrifice of the elasticity, resilience and resistance to abrasion of the soft vulcanised material.

For lining tanks it is desirable to use a combination of a layer of hard rubber cushioned between layers of soft rubber, the hard rubber overlapping but not touching at the joints and imbedded in the soft rubber, thus giving freedom for expansion and contraction. Such a lining can be bonded during the vulcanising process to steel and some other materials for lining tanks, pipes and vessels used in process work or chemical industries.

Chemical Industry Lawn Tennis Tournament

To-day's Final at Oxted

THE postponed semi-final match in the Chemical Industry Lawn Tennis Tournament was played on Monday evening, with the following result: G. F. Hammond and L. Giltrow (Williams, Hounslow, Ltd.) beat C. G. Copp and W. W. Marchant (Doulton and Co., Ltd.) 6-2, 7-5. Arrangements are therefore now completed for the final match, which is to be played at Blunt House, Oxted, by invitation of Sir Ernest and Lady Benn, this (Saturday) afternoon. The finalists are:

S. E. Chaloner and **W. Speakman**
Monsanto Chemical Works, Ltd., Ruabon, N. Wales.

v.

G. F. Hammond and **L. Giltrow**
Williams (Hounslow), Ltd, Hounslow.

In addition to THE CHEMICAL AGE Silver Challenge Cup, which is held by the winners for twelve months, there are four miniature cups to be awarded outright, one each for the winners and one each for the runners-up. The miniature cups for the winners have been presented by Johnson Matthey and Co., Ltd., of 73/82 Hatton Garden, London. These cups are of silver, platinum plated by a process which renders them untarnishable and stainless. The cups for the runners-up are of silver and are presented by Thomas Duxbury and Co., London.

Nearly one hundred guests are expected to attend the match. Sir Ernest and Lady Benn will receive the guests at 2.30 p.m., and the match will commence at 3 p.m. sharp. For the information of those travelling from London to Oxted by rail, convenient trains run as follows:—

Leave Victoria.	Leave London Bridge.	Arrive Oxted.
12.46	12.48	1.37
1.26	1.16	2.3
1.47	1.58	2.45
2.30	2.25	3.9

Trains leave Oxted for London at 4.37, 5.34, 7.8, 7.27 and 9.30 p.m.

For those who are travelling by road, the best route is via Brixton, Streatham Hill, Streatham, Norbury, Croydon, Waddon, Purley, Kenley, Whyteleaf, Warlingham and Caterham, turning left at Tyler's Green.

Both pairs in the final have had to maintain a consistently high standard of play to win their way through the five rounds. Their respective records are as follows:—

CHALONER AND SPEAKMAN.

First round: Beat P. A. Tunstall and J. H. Fisher (Salt Union, Ltd.), 8-6, 6-0.
Second round: Beat A. J. Buck and A. C. Hitchon (Bakelite, Ltd.), 6-0, 6-2.
Third round: Beat C. H. B. Jones and E. Cox (Anglo-Persian Oil Co., Ltd.), 6-3, 6-4.
Fourth round: Beat I. Williams and T. Clarke (Monsanto Chemical Works, Ltd., Ruabon), 7-5, 6-2.
Semi-final: Beat J. W. Urban and F. S. Mortimer (Monsanto Chemical Works, Ltd., London), 3-6, 6-4, 6-1.

HAMMOND AND GILTROW.

First round: Beat W. Backinsell and R. A. Nottingham (Le Grand, Sutcliff and Gell, Ltd.), 6-1, 6-2.
Second round: Beat P. Smith and B. T. Francis (Bakelite, Ltd.), 6-0, 6-0.
Third round: Beat W. S. Alldis and S. Perridge (Chemicals and Coke Ovens, Ltd.), 6-4, 6-1.
Fourth round: Beat E. Thomsett and R. Welsh (British Oxygen Co., Ltd.), 6-2, 6-3.
Semi-final: Beat C. G. Copp and W. W. Marchant (Doulton and Co., Ltd.), 6-2, 7-5.

Analytical Reagent Standards

Second Edition of the B.D.H. "Book of A.R. Standards"

SIX years have elapsed since the issue of the first edition of the B.D.H. "Book of A.R. Standards." During this period important advances in analytical practice have been made, and new and delicate tests have been devised. Many of the B.D.H. specifications have been made more stringent, others have been more accurately defined, and in the new and revised edition which has now been issued, it has been felt desirable to include an even wider range of chemicals to which the term "A.R." can be applied. The second edition therefore contains revised monographs for the 158 chemicals contained in the first edition, and also new monographs for 50 other substances. In addition, the limiting values of the various tests have been stated at the head of each monograph in the form of a table which represents the maximum permissible limit of various impurities. The book defines, as exactly as possible, the commercially attainable standards for many of the chemicals used for scientific purposes for which purity is of the first importance. It is the object of this book to give a precise meaning to the term "A.R." and to provide a clear definition of the purity of chemicals described as "A.R." and sold under the B.D.H. label. It is published at 2s. 6d. and can be obtained from The British Drug Houses, Ltd., Graham Street, London, N.1, at 3s. post free.

New methods for the detection of minute traces of many impurities have been evolved and advantage has been taken of these to render the "A.R." tests more delicate. The use of reagents for new purposes has in some cases revealed the presence of unsuspected impurities, and it has been necessary to devise new methods of purification and new tests for the detection of these impurities. Wherever possible, methods have been used for determining the actual amount of the impurity present; thus, arsenic limits are given for a number of chemicals used for arsenic testing, and full details are given of the methods employed in carrying out these determinations. Most tests, however, do not lend themselves to quantitative statements of results; for these, limit tests have been adopted, and the smallest quantity that can be detected under the conditions of the test has, in most cases, been adopted as the maximum limit of that particular impurity. In this connection, it is of extreme importance that the conditions of the test be adhered to, and nowhere is this more noticeable than in testing for the presence of the sulphate radicle.

A turbidity which is just distinguished in a volume of 50 c.c. of water acidified with 1 c.c. of hydrochloric acid is produced in 1 hour by 0.1 milligram of SO_3; in the presence of 5 c.c. of hydrochloric acid, however, it requires 0.8 milligram of SO_3 to produce the same turbidity. In the tests for sulphates, therefore, the amount of acid used has been reduced to the minimum.

Identification of Gas Cylinders

British Standard Specification

THE British Standards Institution has issued a revision of the B.S.S. No. 349, "Identification Colours for Gas Cylinders." It will be remembered that this specification provided for identification colours for the gases most commonly used, the underlying principle of the scheme being that yellow should represent the toxic or poisonous gases, and red (or maroon) inflammable gases. The specification has now been extended to provide for cylinders used for medical containers for the storage and transport of such gases as oxygen, carbon dioxide, ethyl chloride, ethylene and nitrous oxide. The general scheme differentiates between the cylinders employed for the more commonly used gases, but its value is to some extent contingent upon the general adoption of the standard valves specified in B.S.S. No. 341 (1931). Copies of Specification No. 349 (1932) may be obtained from the Publications Department, 28 Victoria Street, Westminster, S.W.1, price 2s. 2d. each, post free.

The New British Pharmacopœia

A Comparison of the 1932 and 1914 Editions

NOTES on the British Pharmacopœia, 1932, accompany the new price list of chemicals supplied by May and Baker, Ltd., of Battersea. Eighteen years, it is pointed out, is a comparatively long chapter in the history of modern chemistry and pharmacy, and it is not surprising, therefore, that the new British Pharmacopœia reflects progress in many directions when compared with its predecessor of 1914. The notes give in tabular form the more important of the changes effected, including lists of products which were included in the 1914 edition and which have been omitted from the 1932 edition; products which were not included in the 1914 edition, and which now appear in the 1932 edition; products of which the official names appearing in the 1914 edition hav been changed in the 1932 edition; and products appearing in both editions, but which have been altered in strength or in constituents.

The British Science Guild

Forthcoming Lectures

THE British Science Guild announces that the Alexander Pedlar Lecture will be delivered at Burton-on-Trent on November 4 by Professor F. T. G. Hobday, Principal and Dean of the Royal Veterinary College, London. The lecture will be given under the joint auspices of the Burton-on-Trent Natural History and Archæological Society and the British Science Guild, and its subject will be "Animals as a National Asset and Responsibility."

The Norman Lockyer Lecture will be delivered in London on November 22 by Sir Frank E. Smith, Secretary of the Department of Scientific and Industrial Research. The lecture will be given in the Goldsmiths' Hall, Foster Lane, E.C., by courtesy of the Worshipful Company of Goldsmiths. The president of the Guild, the Right Hon. Sir Samuel Hoare, will take the chair. The title of the lecture will be announced later.

Elimination of Sulphur

Utilisation of Waste Straw

THE huge quantities of straw left over after the harvesting of wheat and other cereals present a problem in waste product disposal possibly rivalling in magnitude that represented by the sawdust of the lumber mills. Although conversion into strawboard is a not unpromising line of attack, the development of the strawboard industry has been handicapped by the objectionable character of the waste liquors, the discharge of which into fresh water streams naturally meets with the disapproval of the authorities. It should be mentioned that the straw in the natural state contains a remarkably large amount of sulphur, which is eventually given off from the liquor in the form of sulphuretted hydrogen.

From investigations now described by Dr. H. Bach in "Chemiker-Zeitung" (September 3, pp. 701-703), it may be possible to work out an economical method of eliminating sulphur from the wheat straw before treatment with lime for pulping, thus attacking the problem at the source. This procedure has been proved far less costly than attempting to purify the sulphur-containing waste liquors before discharge into streams. The new method, which incidentally yields a by-product of possible utility as a fertiliser, consists essentially in anaerobic fermentation of the straw under water maintained at the optimum pH of 7.2 to 8.0 by means of carefully graduated additions of caustic alkali. It was eventually found possible to regulate the fermentation in such a manner as to suppress the evolution of sulphuretted hydrogen to a very considerable degree, the odour from the vessel being somewhat reminiscent of cow dung.

The process also suggests the interesting possibility of a new source of methane gas, since 18 litres of the latter were evolved in course of fermentation of one kilogram of straw. But the most valuable feature of the experiments consists in the production of a non-putrefiable straw, from which the greater proportion of the sulphur has been rapidly removed, which is entirely unaltered in appearance, and which, finally, is eminently suitable for the manufacture of strawboard and other materials.

Dyestuffs Licences

Applications in August

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during August has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 358, of which 302 were from merchants or importers. To these should be added one case outstanding on July 31, making a total for the month of 359. These were dealt with as follows: Granted—348 (of which 341 were dealt with within seven days of receipt); referred to British makers of similar products—8 (all of which were dealt with within seven days of receipt); outstanding on August 31—3. Of the total of 359 applications received, 349, or 97 per cent., were dealt with within seven days of receipt.

River Water Pollution

Research on Self-Purification

WATER pollution, with special reference to the scientific survey of the River Tees, was discussed by the Chemistry Section of the British Association at York on September 5.

Dr. H. T. CALVERT (Director of Water Pollution Research) said it was known that rivers which had received polluting liquids were capable of self-purification under certain conditions, but there was a lack of exact knowledge regarding those conditions and the quantities of various effluents which could be allowed to enter a river without unduly retarding the processes of self-purification. It was decided, therefore, to carry out a comprehensive hydrographical, chemical and biological investigation of a river, comparatively pure in some stretches and polluted in others, and the River Tees was finally chosen. The scientific results achieved had been well worth the work involved, and they constituted an important addition to knowledge of the effects of polluting discharges on a river and the extent to which a river could recover from pollution.

Dr. GILBERT BOURNE gave a general account of the survey of the River Tees that has been in progress now for more than a year, and he was followed by several of the actual experts who had been engaged upon the physical, chemical, and biological problems. The river water, the non-tidal reaches, and the estuary have been examined from week to week. Much natural purification from sewage pollution takes place, but, curiously, this has been found to be dependent upon temperature, and it takes place much more slowly in winter than in summer. In the estuary self-purification takes place chiefly at the expense of the oxygen in the water, with the result that large numbers of salmon and sea-smolts perish in the deoxygenated water during their spring migration to the sea. But sometimes it has happened that the death of the seaward-bound fish has been due to over-concentration of cyanides, toxic constituents of coke-oven effluents which could easily have been made harmless by simple treatment. It is an odd circumstance that many of the small invertebrates on which the fish would readily feed are themselves resistant to the cyanides and tar-constituents.

Papers were contributed on the decomposition of sewage in river water; the effects of pollution on the biology of the non-tidal reaches of the River Tees; the effects of sewage and industrial pollution in the Tees estuary, and of pollution on the biology of the estuary; and the susceptibility of invertebrate animals to poisons.

Cod-Liver Oil Production in Norway

PRODUCTION of cod-liver oil in Norway for the season ended June 24, 1932, was reported at about 2,500,000 gallons. Notwithstanding the increased production and favourable prices of Norwegian cod-liver oil, total United States imports of this product during January-April, 1932, were relatively smaller than imports during the corresponding period of 1931. Receipts for the first four months of 1932, most of which originated in Norway, totalled 397,300 gallons valued at £54,000, as compared with 555,400 gallons worth £80,000 in the 1931 period.

New Technical Books

APPLIED CHEMISTRY: A PRACTICAL HANDBOOK FOR STUDENTS OF HOUSEHOLD SCIENCE AND PUBLIC HEALTH. Vol. II. By C. Kenneth Tinkler and Helen Masters. 2nd. Edition, revised. Pp. 284. Crosby Lockwood and Son. 15s. net.

This book is intended primarily for students taking the course in applied chemistry at the University of London, having in view the degree of B.Sc. (Household and Social Science). Volume I dealt with water, detergents, textiles, fuel, etc.; volume II concerns foods. The various chapters cover milk, edible oils and fats, carbohydrate foods, baking powders, meat and meat extracts, vinegar, fruit juices, beverages, the preservation of food, the cooking of food, and calorific values.

* * *

LIESEGANG RINGS AND OTHER PERIODIC STRUCTURES. By Ernest S. Hedges. Pp. 122. Chapman and Hall, Ltd. 10s. 6d. net.

The chemical curiosity discovered by Liesegang thirty-five years ago has developed into a principle which is now recognised as a general feature in natural science, but hitherto no book in the English language devoted to the study of periodic structures has been produced. The subject concerns not only the chemist and physicist, but also the physiologist, the botanist, the zoologist, and the geologist, and the book has been written in a way which aims at serving the needs of investigators in all these branches of natural science; in particular, the physical chemist and the biologist will find the subject a ground for common interests. For the benefit of those readers who are not particularly well acquainted with the principles of colloid science, a chapter has been included on some properties of colloidal media. A special feature of the book is the bibliography, containing references to over five hundred publications, of which 270 have appeared during the last ten years. This bibliography must be a practically complete record of all that is known of both natural and artificial periodic structures. The theoretical side of the subject is discussed in detail and a comprehensive theory of the formation of periodic structures of all types is developed and put forward here for the first time. A practical aspect discussed is in relation to the degree of crimp in wool.

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THE HEAT-TREATMENT AND ANNEALING OF ALUMINIUM AND ITS ALLOYS. By N. F. Budger. Pp. 341. Chapman and Hall, Ltd. 25s. net.

The object of this book is to render available, in a condensed, easily understandable and accessible form, the essence of the present knowledge of a subject which is of growing importance and interest. A vast amount of valuable information is on record in the technical literature, but unfortunately it is so widely scattered as to render difficult the obtainment of a true perspective view of the whole. It is a matter of difficulty, even for the trained scientific mind, to keep abreast of progress in this, as in other departments of metallurgy, on account of the overwhelming array of publications which continue to appear on the subject. For the less technical mind it is a still harder task. Often, too, there is a tendency on the part of authors to clothe relatively simple facts in unnecessarily abstruse language, and so much of it as to obscure the main issues. It has been the author's aim in this work to outline the main principles and salient features of the processes and technique of the heat treatment of aluminium and its alloys as briefly and simply as possible, consistent with presentation of adequate practical and theoretical data.

* * *

THE CHEMISTRY OF LAUNDRY MATERIALS. By D. N. Jackman. Pp. 234. London: Longmans, Green and Co. 6s.

This book has been written in order to meet the demand which has arisen among those occupied in the laundry industry for information about the materials encountered in the laundry—particularly information of a chemical character. Apart from the fabrics themselves water is the foremost among these, while the remaining substances are nearly all detergents and materials used for the removal of stains or for imparting the required finish to the cleansed fabrics. Although some of the information is of a general character such as may be found in any textbook on chemistry, most of it has been obtained from the literature dealing with the materials under consideration. Brief lists of books which may be consulted are given at the ends of the chapters and detailed reference is also made to the reports of the British Launderers' Research Association, the author being chief assistant to this association. The chapter headings are:—Water, alkalies, soaps, bleaches and the removal of stains, fibres and fabrics, starches, acids and blues, fuel, miscellaneous materials, subjects of laundry interest, and the general chemistry of laundry materials.

* * *

TABLES OF CUBIC CRYSTAL STRUCTURE. By I. E. Knaggs, B. Karlik and C. F. Elam. Pp. 90. London: Adam Hilger, Ltd. 11s. 6d. net.

This book is useful for those who practice X-ray methods of crystal analysis of powders and of separate crystals. Elements and compounds are dealt with by Drs. Knaggs and Karlik, while Dr. Elam has contributed a section on alloys. In a foreword, Sir William Bragg remarks that "the length of this summary is its own justification, for it shows how much searching of journals is required to discover whether or no any particular substance has been examined. The authors will no doubt feel some satisfaction in realising that long researches by many workers have been rolled into one, and that they have earned the gratitude of those whose labour they have saved." The aim of the book has been the collection of the available information, which has hitherto been scattered through the scientific journals of the world, in a convenient form. In each section the information is contained in the sets of tables of which the first gives the substances in alphabetical order, with their chemical formulæ and index numbers in the succeeding table and bibliography, the second gives the substances in order of lattice spacing and includes remarks, while the third is a full bibliography. It is of interest to note that the bibliography to the first section extends to more than 800 references and that to the second contains 126 references. The book should go far to encourage the extended use of X-ray methods for chemical analysis by releasing for general and ready use information whose scattered distribution has rendered it difficult of access.

* * *

SOUTH AFRICAN TANNING MATERIALS, Part III. By C. O. Williams. Pp. 92. Union of South Africa, Department of Agriculture. Science Bulletin No. 106. 1s.

This bulletin is the last of a series written by the author, dealing with South African tanning materials. The first dealt with the investigational work carried out in this laboratory on the Black Wattle, while the second part gave the results of similar chemical studies on other trees and plants of South African growth in order to ascertain their value as tanning materials. In this third portion of the memoir, the results of further investigational work in connection with the Black Wattle and other tanning materials have been embodied, in order to supplement the information already given in the first two volumes on these subjects. Most of the bulletin, though, deals with the economical and technical aspects of the wattle industry, with the view of giving compactly in one volume a resumé of the information available on these subjects, and bringing more prominently to the notice of the leather trade the importance of the wattle as a source of tannin. The various sections dealing with the Black Wattle industry have been treated mainly from a historical point of view, as being of more interest to those in contact with the local industry, and also because of the assistance it will give to future investigators. For the latter reason, more especially, a very complete bibliography has in addition been included, which embraces over 600 references arranged in chronological order. South Africa has well established herself as the chief supplier of wattle bark and extract to the world's markets, and it behoves her to take the necessary steps to maintain her supremacy in this direction. This can only be done by continuing and enlarging the scope of the scientific investigations and experiments that have already been commenced in connection with the various phases of the industry.

News from the Allied Industries

Tin Industry

AT a meeting of shareholders of the London Tin Corporation, Ltd., on September 5, to pass the resolutions cancelling the unissued preference shares and creating a like number of ordinary shares, Mr. John Howeson, the chairman, said the alterations would "facilitate the unfreezing of the corporation's reserves of capital." He referred to the recovery in the price of tin and the marked change of sentiment on the London and New York markets, and then observed that in the view of the London Tin board "the time has arrived when it is desirable we should be prepared for action. The resolutions, he added, "will clear the decks and trim your ship."

Whaling Industry

A DECISION which will affect British companies interested in the Norwegian whaling industry was taken at an extraordinary meeting of the shareholders of the A.-S. Hektor Co., the Norwegian whaling concern. It was decided to suspend, provisionally, the trading agreement between the interested British and Norwegian companies. The meeting authorised the board of directors of the Hektor concern to draft a scheme for the continued collaboration between British and Norwegian interests during the period of suspension. A proposal was adopted authorising the transfer to the British Flag or to the Flag of the Falkland Islands of the floating factory "Hektoria" and seven whalers, provided that they are transferred to a company in which the Hektor Company may acquire the total amount of shares.. A/S Hektor, of Tönsberg, is a company associated with Hector Whaling, Ltd., the British company, of which Sir Karl Knudsen is chairman. The Tönsberg concern recently sold to a Manchester firm 15,000 tons of whale oil at £11 per ton. At a meeting recently of the Norwegian Whaling Association, at Sandefjord, it was reported that the Unilever group had purchased 23,000 tons of whale oil from A/S Hektor at £10 per ton. The companies outside the Tönsberg group recently agreed not to sell whale oil below £10 per ton.

Rubber

EXPERIMENTS have been carried out by the Ceylon Government Railways with a view to using scrap rubber in place of coal for firing the boilers of engines. As a result of the success achieved tenders have been called for locally and it is estimated that nearly 200 tons of scrap rubber can be consumed in this way annually at a saving in fuel consumption of about £1,100.

POWERFUL British financial backing is said to be behind a plan to establish in Amsterdam a company for the production of rubber in powdered form. The process has been invented by a Dutchman, and its chief importance lies in the claim that powdered rubber can be produced by a mechanical process, whereas hitherto only a chemical process has been possible. Experiments have also been made in mixing the powdered rubber with asphalt for road surface purposes.

THE directors of the Biting Rubber Estates report that the Dutch operating company earned a profit of £26 in the year ended March 31 last (against a loss of £1,562 for 1930-31), which reduces the debit balance in that company's accounts to £1,535. London expenses (less interest receipts) totalled £638, so that after crediting the £1,526 brought forward in the English company's accounts there is a debit balance on the combined accounts of the two companies of £647, which is carried forward. The crop for the year amounted to 266,575 lb. Tapping ceased on March 31 last, and the estate was placed on a "care and maintenance" basis. Referring to the investment in the Java Oil Exploration Company, which stands in the balance-sheet at £13,628, the directors state that as it is improbable that drilling operations will be resumed, the shares must be considered of little or no value. As and when the conditions of the rubber industry become stabilised, the directors will take steps to deal with the position. In order to carry the estate through the present crisis and to pay off existing liabilities, it is estimated that £7,000 will be required, and shareholders are therefore invited to subscribe for that amount of notes.

Matches

ACCORDING to a message from Stockholm, the representatives of the American creditor banks have now given definite assent to the reconstruction scheme for the Swedish Match Company, as proposed in the report of the reconstruction committee which was issued on August 22. The committee recommended a plan according to which the banks, as secured or unsecured creditors, would grant the company the necessary time for repayment of its loans, during which time interest and a certain amortisation would be paid, the latter depending on the company's yearly earnings.

Malt Distillers

AT a meeting of the Scottish Pot Still Malt Distillers' Association last week-end at Elgin it was decided to recommend to members that pot distilling be stopped for one year. The Association embraces both the large group known as the Scottish Distillers Combine, Ltd., and distilleries which are still privately owned, and the decision will affect about 80 distilleries in all parts of Scotland. A few distilleries, however, are still outside both the combine and the Association. The threatened stoppage is said to be a sequel to the continuance of the duty of 72s. 6d. on every gallon of spirits which has cost only 3s. 6d. to produce. The duty, which in 1914 was only 14s. 9d., was increased in 1919 to 50s., and in the following year for revenue purposes to the present level, and the sequel has been a decline in the home consumption from 26,794,739 gallons in 1914 to a little over 10,000,000 gallons last year.

Beet Sugar

THE effect of the variation of the Government subsidy upon the production of beet sugar is indicated by figures published in the current "Journal of the Ministry of Agriculture." The following figures relate to the financial years 1930-1 and 1931-2:—

	1931-2.	1930-1.
Subsidy Paid—		
Sugar	£1,816,030	£5,512,875
Molasses	£158,000	£630,312
Acreage under sugar beat	234,174	348,920
Beet delivered to factories (tons) ...	1,667,288	3,060,498
Sugar produced (cwt.)	5,027,666	8,485,965
Molasses produced (cwt.)	1,070,000	2,124,575

The subsidy paid in 1930-1 was 13s. per cwt. of sugar; in 1931-2 it was 6s. 6d. per cwt., plus the special additional subsidy of 1s. 3d. given by the Government. That special subsidy has not been continued this year; its place has been taken by a lowering of the Excise duty on beet sugar to give the industry the same amount of assistance. The acreage under sugar beet for the year 1932-3 is 254,800 acres, a slight increase on last year. The subsidy is due to end in 1934. In introducing the Budget the Chancellor of the Exchequer announced that the Government would set up a committee of inquiry into the "refining, production, and distribution" of sugar in the United Kingdom, but the committee has not yet been appointed.

THE report of the British Sugar Manufacturers, Ltd., states that the profits for the year to March 31, after providing for all expenses, including loan and Debenture interest and management commission, amounted to £13,534 (against £29,650 for 1930-31). During the year the company received 110,239 tons of beet (compared with 117,743 tons) and 16,182 tons of raw sugar were produced (against 15,374 tons). The acreage of beet for the past year was considerably in excess of that of the previous year, but the crop was smaller in tonnage and higher in sugar content. The company has contracted for beet from about 12,309 acres for the current season. The stocks of white and unrefined raw sugar in the balance-sheet at cost showed a loss on market value at March 31, 1932, but the company has followed its practice of dealing with the results of refining in the year of the refining campaign, and that loss has been largely covered by the rise in price of sugar since the date of the balance-sheet. The stock will be disposed of as favourable opportunities occur. The company has again co-operated with other factories in connection with the price contracted to be paid to growers for their production during the current year.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

PRICES generally remain unchanged, but with an upward tendency with a rather better demand. The market for coal tar products remains the same, and prices are unchanged from last week. Some easiness has been apparent this week in one or two sections of the Manchester chemical market, but in gneral prices maintain a steady appearance. Interest in forward buying in most cases is at a very low ebb and until the Lancashire cotton mill strike comes to an end hope of revival is remote. The demand during the past week has been on a quiet scale in the aggregate, and it is rare to find buyers disposed to venture much beyond immediate or early needs. A continued improvement is reported in the Scottish heavy chemical market with an increase of home inquiries.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. 0½d. per lb. LONDON: 11½d. less 5%. MANCHESTER: 11½d.

ACID, CRESYLIC.—97/99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID FORMIC.—London: £48 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £220 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £45 10s. per ton in casks, £48 10s. to £52 10s. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £46, ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11½d. per lb. SCOTLAND: B.P. crystals, 1s. 1d. to 1s. 1½d., less 5%, carriage paid. MANCHESTER: 11¼d. to 1s.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £26 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £25 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, power £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 4d. to 3s. 7d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4½d. to 5⅝d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r, or ex works.

CREAM OF TARTAR.—LONDON: £4 7s. 6d. per cwt.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD, ACETATE.—LONDON: White, £34 per ton. Brown £1 per ton less. SCOTLAND: White Crystals £40 to £41 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £33 10s. Brown, £32.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £19 to £21 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£52 per ton d/d.

NICKEL SULPHATE.—£52 per ton d/d.

PHENOL.—Small lots 6¼d. to 6½d. per lb. in 3-cwt. drums, bulk quantities down to 5½d. per lb., delivery free U.K.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £39 to £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £30.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £37.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d.; B.P., 8¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums £18 15s. in casks. Solid 76/77% £14 10s. in drums 70/72% £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d/ 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2¾d. per lb. LONDON: £29 per ton. MANCHESTER: £29.
SODIUM CHROMATE.—3¾d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 to £15 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.
SULPHUR.—£12 per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 6d. to 4s. 11d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.—10½d. per lb.
ACID, TARTARIC.—11¼d. per lb.
BISMUTH SALTS.—Carbonate, 6s. 6d. per lb.; citrate, 8s. 10d.; nitrate (cryst.), 4s. 4d.; oxide, 10s.; salicylate, 7s. 3d.; subchloride, 9s. 10d.; subgallate, 6s. 11d.; subnitrate, 5s. 8d.
POTASSIUM CITRATE.—1s. 6d. per lb.
SODIUM CITRATE, B.P.C. 1911.—1s. 3d. per lb.; B.P.C. 1923 and U.S.P., 1s 7d per lb.

Essential Oils

ALMOND, FOREIGN, S.P.A.—11s. 6d. per lb.
ANISE.—2s. per lb.
BERGAMOT.—11s. per lb.
BOURBON GERANIUM.—26s. 6d. per lb.
CAMPHOR, WHITE.—£4 15s. per cwt.
CITRONELLA OIL, JAVA.—3s. 3d. per lb.
LEMON.—6s. per lb.
LEMONGRASS.—2s. 3d. per lb.
PEPPERMINT, JAPANESE.—4s. per lb.
PETITGRAIN.—5s. 6d. per lb.

Intermediates and Dyes

IN the following list of Intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 0d. per lb., in ton lots.
p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 5d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6¾d. per lb. Crude, 60's 1s. 5¼d. to 1s. 6¼d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 1s. 10d. to 2s.; Refined, 1s 8d. to 1s. 10d.; Pale, 98%, 1s. 6d. to 1s. 7d.; Dark, 1s. 3d. to 1s. 4d. LONDON: 98/100%, 1s 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 8½d. to 9d. per gal. Standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 5d. Pure, 1s. 7d. to 1s. 8d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motors, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3d. to 4d. SCOTLAND: Specification oils, 3¾d to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 5d. per gal.; 95/160, 1s. 5d.; 90/190, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 1s. 1d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
TOLUOL.—90%, 2s. 1d. to 2s. 2d. per gal.; Pure, 2s. 5d. to 2s. 6d.
XYLOL.—1s. 9d. per gal.; Pure, 1s. 11d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 5s. per ton. Grey, £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £8 10s.; grey, £11 10s.
ACETIC ACID, TECHNICAL, 40%.—£16 10s. to £18 per ton.
ACETONE.—£63 to £65 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 10s. to £11 per ton.
IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gal.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.
BROWN SUGAR OF LEAD.—£32 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export market remains firm at £4 10s. per ton, for prompt shipment, f.o.b. U.K. port in single bags. It is expected that the price will advance as the consuming season draws nearer. The home price continues unchanged at £5 5s. per ton delivered in 6-ton lots. Further bookings have taken place.
NITRATE OF SODA.—The price remains unchanged at £8 8s. per ton for September delivery advancing by steps to £8 10s. for spring delivery. Sales up to the present have been small.
NITRO-CHALK.—The price remains unchanged at £7 5s. per ton for 6-ton lots for delivery up to June, 1933, and it is reported that purchases of small quantities have been made for delivery in the spring.

Latest Oil Prices

LONDON, September 7.—LINSEED OIL was steady. Spot, small quantities, £19 10s.; Sept., £16 17s. 6d.; Oct.-Dec., £17 7s. 6d.; Jan.-April, £18 5s.; May-Aug., £19 5s. naked. RAPE OIL was quiet. Crude, extracted, £29; technical refined, £31, naked, ex wharf. COTTON OIL was firm. Egyptian crude, £23; refined common edible, £26 10s.; deodorised, £28 10s., naked, ex mill. TURPENTINE was steady. American, spot, 62s. per cwt.
HULL.—LINSEED OIL, spot, closed at £16 15s. per ton; Sept., £16 7s. 6d.; Oct.-Dec., £16 15s.; Jan.-April, £17 15s.; May-Aug., £18 15s. COTTON OIL, Egyptian, crude, spot £23 10s.; edible, refined, spot, £25 10s.; technical spot, £25 10s.; deodorised, £27. PALM KERNEL OIL, crude, f.m.q., spot, £22 10s., naked. GROUNDNUT OIL, crushed/extracted, spot, £30 10s.; deodorised, £26 10s. SOYA OIL, crushed/extracted, spot, £23 10s.; deodorised, £26 10s. RAPE OIL, crushed/extracted, spot, £28; refined, £29 10s. per ton. COD OIL, 15s. 6d. per cwt. TURPENTINE, American, spot, 63s. per cwt. CASTOR OIL, pharmacy, spot, 41s. 6d.; first, 36s. 6d.; second, 31s. 6d. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Wetting Agents

CASTOR oil or mixtures of castor oil with other vegetable oils or fatty acids derived therefrom are sulphonated at temperatures above 0° C. but below 35° C., in the presence of sulphur dioxide or substances which yield the latter, *e.g.*, sulphites or bisulphites, but excluding liquid sulphurous acid. The sulphonation may be followed, before neutralising but preferably after washing, by an oxidation treatment. In an example, castor oil is sulphonated with sulphuric acid at 30° C. while stirring and introducing a stream of sulphur dioxide. Alternatively, instead of passing in sulphur dioxide, the castor oil is agitated with powdered sodium bisulphite or anhydrous or crystalline sodium sulphite, and treated with sulphuric acid. After washing, the sulphonated oil is oxidised by means of air, oxygen, nitric acid or hydrogen peroxide and finally neutralised. (See Specification No. 365,904, of J. Riley and Sons, Ltd., H. W. Bentley, and W. M. Coates).

Specifications Accepted with Dates of Applications

METHOD OF MANUFACTURING WASHING AND CLEANSING AGENTS, AND PRODUCTS OF THE SAID METHOD. A. Schreiber and F. Martens. Feb. 24, 1931. 379,318.

MANUFACTURE OF AMMONIUM CARBONATE AND BICARBONATE. P. Parrish. Feb. 25, 1931. 379,319.

APPARATUS FOR THE DETECTION, INDICATION AND DETERMINATION OF CARBON MONOXIDE OR THE LIKE. G. Ljünggren. Feb. 26, 1931. 379,304.

COLD CEMENT-GLAZE COMPOSITIONS. A. J. Lagas. Feb. 27, 1931. 379,320.

DYEING. Imperial Chemical Industries, Ltd., and D. Carter. Mar. 23, 1931. 379,321.

PROCESSES OF TREATING NICKEL-BEARING MATERIALS. International Nickel Co., Inc. Aug. 15, 1930. 379,322.

COATING COMPOSITIONS. E. I. Du Pont de Nemours and Co. June 3, 1930. (379,292.)

PROCESS FOR REDUCING METAL SULPHIDES. A. A. Johnson (trading as Johnson & Co.), B. M. S. Kalling and C. von Delwig. May 22, 1931. 379,331.

MANUFACTURE OF INSOLUBLE AZO-DYESTUFFS ON FIBRES. W. W. Groves (*I. G. Farbenindustrie*). May 22, 1931. 379,279.

MANUFACTURE OF INSOLUBLE AZO-DYESTUFFS ON FIBRES. W. W. Groves (*I. G. Farbenindustrie*). May 22, 1931. 379,280.

PROCESS AND APPARATUS FOR THE CONTINUOUS MANUFACTURE OF ESTERS. F. A. F. Crawford and Imperial Chemical Industries, Ltd. May 26, 1931. 379,312.

PURIFICATION OF SULPHUR. J. S. Dunn and Imperial Chemical Industries, Ltd. May 26, 1931. 379,313.

ARTIFICIAL MORDANTING SUBSTANCES. Imperial Chemical Industries, Ltd., E. Chapman and E. B. Robinson. May 26, 1931. 379,314.

CARRYING OUT CATALYTIC REACTIONS. J. Y. Johnson (*I. G. Farbenindustrie*). May 26, 1931. 379,335.

PROCESS FOR THE MANUFACTURE OF PYRIDINE DERIVATIVES. E. Koenigs and H. Greiner. May 26, 1931. 379,316.

MANUFACTURE OF 2-AMINO- AND 2-SUBSTITUTED AMINO-ARYLENETHIAZOLES. E. I. Du Pont de Nemours and Co. May 27, 1930. 379,341.

FLUXES FOR SOLDERING. American Chemical Paint Co. Dec. 17, 1930. 379,347.

CONTAINERS FOR FLUIDS UNDER PRESSURE. W. Kidde and Co., Inc. June 12, 1930. 379,348.

TEXTILE PRINTING BY MEANS OF VAT AND SULPHUR DYESTUFF PREPARATIONS. A. Carpmael (*I. G. Farbenindustrie*). May 28, 1931. 379,360.

MANUFACTURE OF QUARTGARY AMMONIUM SALTS. Imperial Chemical Industries, Ltd., A. W. Baldwin, and A. J. Hailwood. June 1, 1931. 379,396.

MANUFACTURE AND PRODUCTION OF COLOUR LAKES. Imperial Chemical Industries, Ltd., H. H. Stocks and F. W. Linch. June 1, 1931. 379,397.

PREPARATION OF A FERTILISER CONTAINING CALCIUM PHOSPHATE AND NITROGEN. Chemische Fabrik Kalk Ges., H. Oehme, and E. Herrmuth. June 27, 1930. 379,431.

MANUFACTURE OF AMMONIUM MAGNESIUM PHOSPHATIC FERTILISERS. E. Urbain. June 28, 1930. 379,433.

MANUFACTURE OF AMMONIUM MAGNESIUM PHOSPHATIC FERTILISERS. E. Urbain. Nov. 15, 1930. 379,434.

MANUFACTURE OF ALKALINE OR AMMONIACAL SULPHITES OR HYPOSULPHITES OF FATTY ACIDS. R. Vidal. June 20, 1931. 379,438.

PROCESS FOR PREVENTING THE BLEEDING OF DYED TEXTILES ON WOOL. Soc. of Chemical Industry in Basle. June 20, 1930. 379,442.

MANUFACTURE OF LIME NITROGEN. Dr. N. Caro and Dr. A. R. Frank. Aug. 6, 1931. 379,493.

PRODUCTION OF AMMONIA, POTASSIUM CARBONATE, AND POTASSIUM HYDROXIDE. A. Mentzel. Oct. 24, 1930. 379,549.

MANUFACTURE OF AZO-DYESTUFFS ON THE FIBRE. Soc. of Chemical Industry in Basle. Nov. 3, 1930. 379,555.

MANUFACTURE OF PIGMENTS. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Jan. 14, 1931. 379,572.

PRODUCTION OF GUANIDINE THIOCYANATE. Ges. für Kohlentechnik. Dec. 12, 1930. 379,580.

HYDROGENATION OF CARBONACEOUS MATERIALS, AND CATALYSTS THEREFOR. International Hydrogenation Patents Co., Ltd. Dec. 18, 1930. 379,587.

MANUFACTURE OF ACID-WOOL DYESTUFFS OF THE ANTHRAQUINONE SERIES. W. W. Groves. July 9, 1931. 379,630.

MANUFACTURE OF BITUMINOUS AND LIKE PAINTS OR COATING MATERIALS. P. Lechler (trading as P. Lechler (Firm of).) Feb. 27, 1932. 379,632.

MANUFACTURE OF CELLULOSE ESTERS. A. G. Bloxam (*Soc. of Chemical Industry in Basle*). June 23, 1931. 379,658.

Complete Specifications open to Public Inspection

METHOD OF PREPARING PLASTICISABLE CELLULOSIC COMPOUNDS. O. R. Schultz. Aug. 27, 1931. 23204/32.

PROCESS FOR THE MANUFACTURE OF A PHOSPHORIC ACID ESTER OF GLUCONIC ACID. Schering-Kahlbaum Akt.-Ges. Aug. 26, 1931. 23315/32.

MANUFACTURE OF HYDROXYLATED DIPHENYLS. E. I. Du Pont de Nemours and Co. Aug. 24, 1931. 23582/32.

PRODUCTION OF FORMIC ACID. E. I. Du Pont de Nemours and Co. Aug. 24, 1931. 23741/32.

PRODUCTION OF FORMIC ACID. E. I. Du Pont de Nemours and Co. Aug. 24, 1931. 23742/32.

MANUFACTURE OF CYANINE DYES. Kodak, Ltd. Aug. 27, 1931. 24022/32.

Applications for Patents

PRODUCTION OF LIQUID FUELS. Anglo-Persian Oil Co., Ltd. Aug. 29. 24145.

PRODUCTION OF BLEACHING CLAYS FROM NATURAL SILICATES. Bayerische Akt.-Ges. für Chemische und Landwirtschaftlich Chemische Fabrikate. Sept. 3. (Germany, Sept. 3, '31.) 24632.

SOFTENING WATER. Chemische Fabrik Budenheim Akt.-Ges. Sept. 3. (Germany, Sept. 3, '31.) 24586.

ELECTRODEPOSITION OF COBALT. W. H. Cole. Sept. 2. 24521.

CONVERSION OF COAL DISTILLATION PRODUCTS INTO VALUABLE HYDROCARBONS. C. J. Greenstreet. Sept. 1. 24436.

ANTHRAQUINONE DYESTUFFS, ETC. N. H. Haddock, Imperial Chemical Industries, Ltd., F. Lodge, and C. H. Lumsden. Sept. 1. 24403.

MANUFACTURE OF ALKALI SILICATES, ETC. Henkel et Cie Ges. Aug. 30. (Germany, Aug. 2.) 24228.

MANUFACTURE OF SUBSTANCES PRODUCING FLUORESCENCE AND SOLUBLE IN HYDROCARBON OILS. J. Y. Johnson (*I. G. Farbenindustrie*). Aug. 29. 24101.

MANUFACTURE OF ALIPHATIC AMINES. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 1. 24395.

APPARATUS FOR GASIFICATION OF FINELY-GRAINED MOIST FUELS. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 1. 24396.

DYEING ANIMAL FIBRES. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 1. 24397.

MANUFACTURE OF AMINOALKYL SULPHONIC ACIDS. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 2. 24512.

PROCESS OF PRODUCING PURE HYDROGEN FLUORIDE. I. G. Farbenindustrie. Aug. 31. (Germany, Sept. 2, '31.) 24311.

VULCANISATION OF RUBBER. I. G. Farbenindustrie. Sept. 1. (Germany, Sept. 2, '31.) 24400.

MANUFACTURE OF STABLE REDUCTION PRODUCTS OF DYESTUFFS OF THE INDIGO SERIES. I. G. Farbenindustrie. Sept. 2. (Germany, Sept. 18, '31.) 24511.

MANUFACTURE OF VARNISHES. Imperial Chemical Industries, Ltd. Sept. 2. 24561.

DYEING CASEIN PRODUCTS, ETC. R. Lee. Sept. 2. 24528.

RECOVERY OF PALE FATTY ACIDS FROM ACID OILS. W. J. Tennant (*Naamlooze Vennootschap Maatschapij tot Exploitatie der Vereenigde Oliefabrieken Zwijndrecht*). Aug. 29. 24102.

WATER SOFTENING, ETC., APPARATUS. Paterson Engineering Co., Ltd., and W. Smalley. Sept. 2. 24554.

From Week to Week

SIR HARRY MCGOWAN, chairman of Imperial Chemical Industries, Ltd., leaves England to-day (Saturday) in the Empress of Britain for a brief visit to Canada and the United States.

MR. F. C. FAIRHOLME has resigned from the managing directorship of Thos. Firth and John Brown, Ltd., the Sheffield steel manufacturers, a position which he has held jointly with Mr. A. J. Grant since the merger transaction of last year.

SIR ERNEST BENN announces the early launching from Bouverie House of a new journal devoted to the interests of the laundry industry. The journal will be published weekly and will bear the title of "The Laundry World." Capt. A. P. Anderson has been appointed manager of the new journal, and Mr. M. W. Joynes has accepted the chief editorial post.

GJERS MILLS AND CO. are rekindling at Ayresome Ironworks, Middlesbrough, two blast furnaces to produce hematite pig-iron. The works have been closed for a lengthy period. The restarting of the plant will afford employment to some 200 men and will increase the number of blast furnaces in operation on Teeside to 17. There are 86 blast-furnaces on the North-East Coast. In normal pre-war times the number blowing was over 60.

MR. F. E. HAMER, a director of Benn Brothers, Ltd., who retired on June 30 from the Editorship of THE CHEMICAL AGE on account of the state of his health, sustained a sad bereavement on September 3, in the death of his wife, at the age of 66, after a long illness. His many friends in the chemical industry will join with us in offering Mr. Hamer our deepest sympathy. The funeral was at Golders Green on Tuesday.

ADDRESSING THE EXETER ROTARY CLUB on Monday, September 5, Captain J. H. Blakesley, a representative of the League of Industry, mentioned that during the past few months his organisation had been asked by a great many industries to support their applications for increased protective duties, and so far as the West Country was concerned, the League had taken up the claims of the pottery and paper making industries.

PREPARATIONS ARE NOW BEING MADE in Devon with regard to the new valuation lists which, under the Rating and Valuation Act, 1925, have to be deposited next July. All business premises, shops, showrooms and storerooms have to be measured by the authorities, and it is anticipated that the new assessments will show an increase in the gross value of business establishment generally throughout the county.

WORKING OF EXTENSIVE SILICA DEPOSITS in County Cork is at present being carried on by Silica Industries, Ltd., and a factory has recently been established at Rostellan for the manufacture of silica products. A considerable amount of research work has been carried out by the technical director of the company, Professor Bayley Butler, and a number of analyses of the deposits have been made by Miss P. Ryan, M.Sc., the public analyst, Professor T. Swain, University College, Cork, is supervising the geological investigation of the deposits.

MR. S. P. HEWITT has been appointed general manager of Edgar Allen and Co. (Canada), Ltd., 116 McGill Street, Montreal. Mr. Hewitt, whose father Mr. S. J. Hewitt, is chief metallurgist of Edgar Allen and Co., Ltd., Sheffield, will be responsible for the conduct of the entire Canadian business, including sales. Mr. J. K. Schofield will remain secretary and treasurer to the company, while Mr. G. E. Membery will continue to be in charge of the Toronto branch of Edgar Allen and Co. (Canada), Ltd., and will act as sales manager.

THE SECRETARY FOR MINES announces that an Order has been made in pursuance of Section 61 of the Coal Mines Act, 1911, adding to the List of Permitted Explosives to be used in certain classes of the mines, the following explosives:—(a) A.1 Rounkol, manufactured by Nobel's Explosives Co., Ltd., (b) Eversoft L.D. Extra, manufactured by Explosives and Chemical Products, Ltd. These explosives are permitted only for the purpose of bringing down coal. The Order, which is entitled the Explosives in Coal Mines Order of August 31, 1932, will shortly be published, and may be purchased through any bookseller or directly from H.M. Stationery Office.

RECENT WILLS include: Mr. Charles Noel Farley, of Overdale, Fulwith Mill Lane, Harrogate, and of Charles F. Thackray, wholesale chemists, £7,830 (net personalty £5,227); Lieutenant Colonel Walter Grant Petersen Morden, M.P. for Brentwood and Chiswick 1918-31, who had been concerned in the flotation of numerous large companies (including the British Cellulose and Chemical Manufacturing Company and various Canadian Steamship Lines), a former Master of the Avon Vale Hunt, £10; Mr. Joseph Alfred Fisher, of The Coppice, Shortlands, Kent, fomerly chairman of Bell's United Asbestos Co., Ltd., who died on June 8, £41,420; Mr. Thomas Pilkington, of 22 Polefield Road, Blackley, Manchester, chemical manufacturer, of T. Pilkington and Co., Yew Tree Chemical Works, Collyhurst, £5,324 (net personalty £4,279).

ACCORDING TO A MEMORANDUM from the Customs Division of the Department of National Revenue, Canada, the importation of goods for sale bearing thereon or on the containers thereof the word or trade mark "Vaseline" is now prohibited.

MR. D. OWEN EVANS, of Llangranog, administrative director of the Mond Nickel Co., Ltd., has been selected by the Cardiganshire Liberal Association as Liberal candidate in the by-election caused by the appointment of the sitting Member, Mr. R. Hopkin Morris, as a Metropolitan Police Magistrate.

ATHOLE G. ALLEN AND CO., Stockton-on-Tees Chemical Works, Stockton-on-Tees, inform us that they are now regularly manufacturing a high grade quality of barium chloride at their works at Stockton, using all British raw materials. They believe they are the only makers in Great Britain of this product which has hitherto been imported exclusively from abroad.

THE ANNUAL CHEMICAL DINNER, to be followed by a dance, is to be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on Thursday, December 8. As usual, this will be a social event in which members of the principal societies and institutions connected with chemistry will be invited to participate. Professor H. E. Armstrong, F.R.S., has consented to preside. Further particulars will be announced in due course.

THE RIGHT HON. JOHN WILLIAM WILSON, of Perrycroft, Colwall, Hereford, M.P. for North Worcestershire, from 1895 to 1922, managing director of Albright and Wilson, manufacturing chemists, Oldbury, a director of the British Match Corporation, Ltd., Bryant and May, Ltd., and the Great Western Railway Company, who died on June 18 last, aged 73 years, son of the late John Edward Wilson, of Wyddrington, Church Road, Edgbaston, left estate of the gross value of £207,993, with net personalty £192,730.

AN ORDER issued by the Executive Council of the Free State last week modifies recently-imposed tariffs under the Emergency (Imposition of Duties) Act, 1932. Permission may, in future, be granted by the Minister for Finance for certain licencees to import any tariffed articles under the new Act free of duty provided that they are required solely for manufacturing purposes in the Irish Free State. Glucose and other sweetening preparations are amongst the articles affected by this Order.

DURING JULY, 1932, the imports of chemical manures and fertilisers into the Irish Free State were valued at £6,780, a sharp decline on the figures for the corresponding month of 1931, when the total value was over £25,000. The import value of the chemicals, drugs, perfumery and similar articles also declined and in July, 1932, the value was £101,770, as compared with £134,042 in the corresponding month of last year. The sharp falling off of imports in the Irish Free State may be accounted for by the heavy tariffs imposed under Mr. De Valera's first Budget and by subsequent Orders.

WORKERS AT THE CHEMICAL RESEARCH LABORATORY under the Department of Scientific and Industrial Research have found that the best index of atmospheric pollution is the green colour which appears on copper or bronze exposed to the air. This colour, which is known as verdigris when it is unwanted and as "patina" when the effect is decorative, can, it is said, now be produced artificially by electricity in 15 minutes compared with the 20 years which is necessary under natural conditions. It used to be thought that this colour was produced by pure air, but it has been found that it is almost entirely due to sulphur from city smoke.

DR. M. O. FORSTER, director of the Indian Institute of Science, Bangalore, issued a questionnaire in August, 1931, with a view to eliciting the amount of support which an Indian science news journal on the plan of "Nature" would receive from scientists and scientific institutions in that country. The response being encouraging, the matter was placed before a meeting of the Indian Science Congress members early this year, when the need for such a journal was unanimously admitted and a committee was constituted to work out details. It was decided to issue the journal as a monthly under the name of "Current Science." The first number, July, 1932, has now been received. It includes special articles; letters to the Editor, consisting of short notes of original investigations; research notes and similar topics; science news; notes and articles on industrial topics including all branches of applied science; and reviews of books. The annual subscription is Rs. 6. Intending subscribers should communicate with the Secretary, "Current Science," Indian Institute of Science, Bangalore.

Obituary

MR. D. C. BREEN, of Killarney, well known in the chemical trade in Ireland, at the Richmond Hospital, Dublin, in his fortieth year.

MR. JOSEPH WHEATLEY, retired wholesale chemist and druggist, at his residence, Queen's Road, Edgerton, Huddersfield. A native of Huddersfield, Mr. Wheatley was 72 years of age.

Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

France.—A commission agent established in Paris wishes to obtain the representation of United Kingdom manufacturers of calcined magnesia. (Ref. No. 335.)

Sweden.—A commission agent at Gothenburg wishes to obtain the representation of United Kingdom manufacturers of lubricating oil, Turkey red oil and weed killers. (Ref. 338.)

British India.—An old established Parsee firm in Bombay desires commission agencies for drugs, chemists' sundries and perfumery for the Bombay Presidency. (Ref. No. 303.)

Burma.—An Anglo-Indian firm of manufacturers' agents in Rangoon desires agencies for United Kingdom manufacturrers of chemicals, etc., for Burma. (Ref. No. 314.)

British India.—A firm of manufacturers' representatives and agents at Calcutta desires to secure United Kingdom agencies for paints, enamels, varnishes, disinfectants, etc., for Bengal, Bihar, Oriss and Assam. (Ref. No. 309.)

Malta.—A Valletta firm of import and export merchants and commission agents wishes to represent United Kingdom manufacturers of lubricating oil, grease, white lead, linseed oil, paints, etc. (Ref. No. 324.)

Salvador.—The Acting British Consul at Bahai reports that a local agricultural college desires to purchase supplies of laboratory equipment, apparatus and chemicals, and other appliances usually required by such schools. (Ref. B.X. 7410.)

South Africa.—The British Trade Commissioner at Johannesburg reports that the South African Railway and Harbours Administration is calling for tenders (Tender No. 2082), to be presented in Johannesburg by October 24, 1932, for the supply of ready-mixed and paste paints, paint ingredients, etc. (Ref. B.X. 7407.)

New Zealand.—An Auckland firm of import and export merchants wishes to represent United Kingdom manufacturers of essences and colours and chemicals for foods and beverages, essential oils, whale oil, gum arabic, etc. for the whole of New Zealand or alternatively for the North Island only or the northern half of the North Island. (Ref. No. 328.)

Brazil.—The Brazilian Embassy announces that by a Decree No. 21,201 of March 24, 1932, the Brazilian Federal Government have given powers to the Ministry of Agriculture to make contracts with companies, private firms, etc., for the erection of plants for the production of absolute alcohol (anhydrous). Offers must be submitted to the Ministry of Agriculture at Rio de Janeiro not later than September 28. A copy of the Decree (in Portuguese) with a translation, may be consulted at the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref. 28104/32.)

Company News

Doulton & Co.—It is announced that payment of dividend on the preference shares is postponed until the year's results are available.

United Glass Bottle Manufacturers, Ltd.—An interim dividend is announced, payable on September 17 on the ordinary shares, at the rate of 2½ per cent.

Amalgamated Zinc (de Bavay's), Ltd.—A dividend at the rate of 5 per cent. per annum for the six months ended June 30 last has been declared payable on October 8.

Staveley Coal & Iron Co., Ltd.—A final dividend of 2½ per cent. making 5 per cent., tax free, for the year to June 30 last, is announced. Last year a final dividend of 3½ per cent. was paid, making 6 per cent., tax free.

F. Steiner & Co., Ltd.—After providing £36,807, against £33,558 for repairs and depreciation, the accounts for the year to July 31, 1932, show a profit on trading of £5,572, compared with a loss of £126,295 in the previous twelve months. With £23,992 surplus on realisation of investments, there is £29,564. Deducting debenture interest, the balance for the year is £11,564, against a debit of £144,295 a year ago.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to October 7, 1932.

Ace Brand. 533,767. Class 3. Chemical substances prepared for use in medicine and pharmacy. Burgoyne, Burbridges & Co., Ltd., High Street South, East Ham, London, E.6. July 26, 1932.

Vermogal. 533,074. Class 3. Chemical substances prepared for use in medicine and pharmacy. Société Des Vermienes (Société Anonyme) (a Joint Stock Company registered under the laws of France), 46 Rue du Bac, Asnières (Seine), France. July 1, 1932.

Normalax. 534,019. Class 3. Chemical substances prepared for use in medicine and pharmacy. Norgine Pharmaceutical Products (London), Ltd., 3 and 4 Clement's Inn, Kingsway, London, W.C.2. August 5, 1932.

Dehydag. 532,768. Class 4. Raw, or partly prepared, vegetable, animal and mineral substances used in manufactures, not included in other classes. Deutsche Hydrierwerke Aktiengesellschaft. June 20, 1932.

Dehydag. 532,767. Class 1. Chemical substances used in manufacturers, photography, or philosophical research, and anti-corrosives. Deutsche Hydrierwerke Aktiengesellschaft (a Joint Stock Company organised under German Law), Kantstrasse 163, Berlin-Charlottenburg, Germany. June 20, 1932.

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